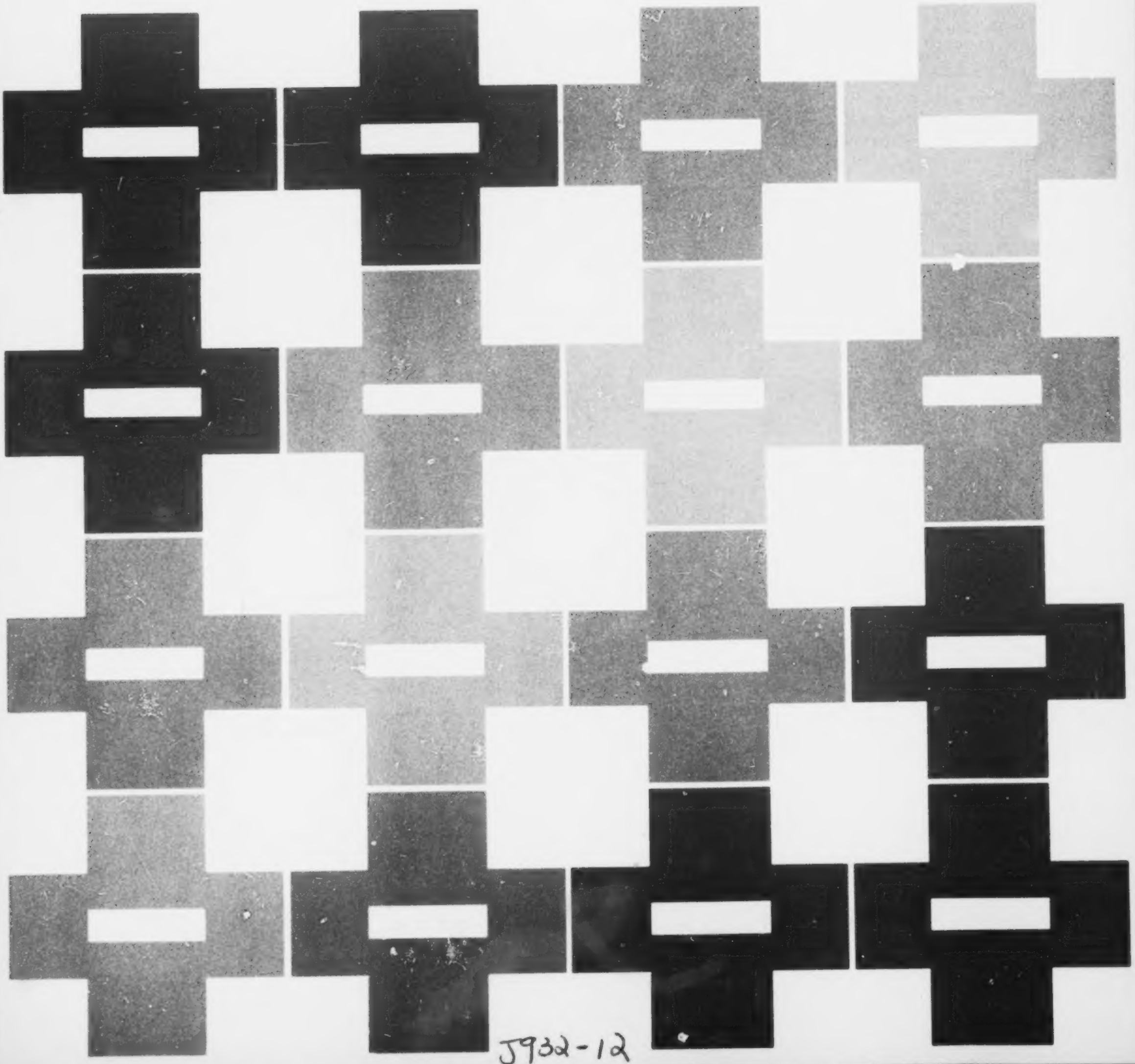
CONGRESS OF THE UNITED STATES
CONGRESSIONAL BUDGET OFFICE

MARCH 1988

How Capital Gains Tax Rates Affect Revenues: The Historical Evidence



J932-12

A CBO STUDY

HOW CAPITAL GAINS TAX RATES AFFECT REVENUES: THE HISTORICAL EVIDENCE

The Congress of the United States
Congressional Budget Office

PREFACE

The taxation of capital gains has been changed frequently in the past two decades, most recently in the Tax Reform Act of 1986. What have been the effects of these changes on revenues? The revenue effects of changes in capital gains taxation are uncertain because taxpayers may choose to hold onto their assets instead of selling them. Thus, changes in realizations of gains can offset the direct effects of changes in tax rates. This report reviews previous research on the effects of changes in capital gains tax rates on the realizations of gains and presents new evidence based on a statistical analysis of taxpayer behavior over the past 30 years. The new estimates of behavioral responses are used to assess the probable revenue consequences of the recent Tax Reform Act and of a proposal to lower the maximum tax rate on capital gains. The report was prepared in response to separate requests from Congressman William Gray III, Chairman of the House Budget Committee, and Congressman Willis Gradison, member of the House Budget Committee and House Ways and Means Committee. In keeping with the mandate of the Congressional Budget Office to provide objective analysis, the study contains no recommendations.

The paper was prepared by Eric Toder and Larry Ozanne of the Tax Analysis Division, under the direction of Rosemary Marcuss. A number of people inside and outside of CBO reviewed drafts and provided valuable comments. They include Gerald Auten, Thomas Barthold, Leonard Burman, Paul Courant, Albert Davis, Frank deLeeuw, Marilyn Flowers, Edward Gramlich, Jane Gravelle, Jon Hakken, Eric Hanushek, Richard Kasten, Donald Kiefer, John O'Hare, Rosemarie Nielsen, Rudolph Penner, Jack Rodgers, Frank Sammartino, Joel Slemrod, Ralph Smith, John Sturrock, and Bruce Vavrichek. Responsibility for the finished product, however, rests with CBO. The revenue simulations using the CBO Individual Income Tax Model were performed by Frank Sammartino. Daniel Polsky provided computational assistance. Francis Pierce edited the manuscript. Linda Brockman prepared early drafts of the manuscript, and Kathryn Quattrone prepared the final draft for publication.

James L. Blum
Acting Director

March 1988

CONTENTS

SUMMARY xi

I INTRODUCTION 1

II PREVIOUS RESEARCH ON THE REVENUE EFFECT OF CAPITAL GAINS TAXES 5

Approaches to Estimating the Realizations Response *5*
Measures of Revenue Effects *7*
The Studies *8*
Other Revenue Effects of Capital Gains Tax Changes *17*

III CAPITAL GAINS TAXES AND REALIZATIONS, 1954-1985 21

Distribution of Gains Among Income Groups *21*
Growth in Capital Gains Realizations Over Time *24*
Marginal Tax Rates and Realizations of Gains: A First Glance *40*
Revenue from Capital Gains Taxes *41*

IV STATISTICAL EVIDENCE ON CAPITAL GAINS AND TAX REVENUES 45

Determinants of Capital Gains Realizations *45*
Statistical Estimates *51*
Reliability of the Estimates and Their Implications for Revenue Effects *59*
Evaluation of Findings *66*

APPENDIXES

A Alternative Estimates of the Response of Capital Gains Realizations to Tax Rates *73*

B Methodological Issues in Studies of the Realizations Response *97*

TABLES

1.	Summary of Previous Studies on Revenue Effects of Capital Gains Taxes	18
2.	Distribution of Long-Term Capital Gains by Adjusted Gross Income (AGI): 1984	22
3.	Realized Net Long-Term Gains Compared with Gross National Product, 1954-1985	25
4.	Realizations of Net Long-Term Gains Compared with Corporate Equity Held by Individuals, 1954-1985	27
5.	Ratio of Realized Net Long-Term Gains to Gross National Product, by Income Group, 1954-1985	29
6.	Share of Realizations of Net Long-Term Gains by the Highest-Income Groups, 1954-1985	31
7.	Maximum Marginal Tax Rate on Capital Gains, 1954-1988	36
8.	Estimated Weighted Average Marginal Tax Rate on Capital Gains, 1954-1985	38
9.	Revenue Attributable to Taxes on Long-Term Capital Gains, 1954-1985	43
10.	Regression Equations Explaining Capital Gains Realizations for All Taxpayers, 1954-1985	52
11.	Actual Minus Fitted Gains in Recent Years in Equations for All Taxpayers	54
12.	Regression Equations Explaining Capital Gains Realizations for the Top 1 Percent of Returns, 1954-1985	56

13. Regression Equations Explaining Capital Gains Realizations for the Bottom 99 Percent of Returns, 1954-1985 57

14. Confidence Intervals for Tax Effect on Realizations and Revenue-Maximizing Rate for Entire Population of Taxpayers 60

15. Implied Shape of Relationship Between Tax Rates and Revenue from Capital Gains Taxes 61

16. Comparison of Capital Gains Revenue Under Pre-1986 Law with Revenue Under Current Law and Under a 15 Percent Maximum Rate 64

A-1. Alternative Equations Explaining Capital Gains Realizations 76

A-2. Equations Explaining Capital Gains Realizations Using Wealth Instead of Income Variables 83

A-3. Equations Explaining Capital Gains Realizations Using Alternative Tax Rate Specifications 88

A-4. Equation Explaining Capital Gains Realizations Using Changes in Asset Values and Basis 91

FIGURES

1. Realized Net Long-Term Gains and Gross National Product, 1954-1985 26

2. Realized Net Long-Term Gains and Corporate Equity of Households, 1954-1985 28

3. Ratio of Realized Long-Term Gains to Gross National Product, by Income Group, 1954-1985 30

4. Average Marginal Tax Rates on Long-Term Gains for Selected AGI Groups 39

5. Marginal Tax Rates on Long-Term Gains and the Ratio of Long-Term Gains to Gross National Product 41

6. Relationship of Revenue from Capital Gains Taxes to Marginal Tax Rates on Gains 62

A-1. Relationship of Revenue from Capital Gains Taxes to the Marginal Tax Rate on Gains for Four Specifications of the Tax Rate Variable 90

BOXES

1. Estimating Accrued Gains 47

2. Revenue Simulations 65

SUMMARY

The Tax Reform Act of 1986 lowered marginal personal income tax rates but also eliminated many tax preferences, including the 60 percent deduction for long-term capital gains. The maximum tax rate on long-term gains was increased from 20 percent under previous law to 28 percent for the highest-income taxpayers and 33 percent for taxpayers just below the highest-income group. The reasons for eliminating the capital gains deduction were to help finance the reduction in ordinary income tax rates, to allow the top rate to be cut substantially without providing disproportionate relief to the highest-income group, and to simplify the tax system.

How much additional revenue will be obtained by increasing tax rates on capital gains is uncertain. Taxpayers can defer the payment of capital gains taxes by not realizing the gains--that is, by holding onto assets instead of selling them; they can avoid taxation of gains entirely by passing on their assets to others at death. If realizations decline by a greater percentage than the tax rate increases, revenues from capital gains taxes could fall instead of increasing.

A number of statistical studies have provided strong evidence that realizations of capital gains decline when tax rates on gains are increased. The estimated size of this response of capital gains realizations, however, differs greatly among studies. The responses estimated in some studies have been used to support a claim that the 1986 act reduced revenue from capital gains taxes when it increased the tax rates, and that lowering the maximum tax rate on long-term gains to 15 percent would increase revenue. The estimates in other research suggest an opposite conclusion. Moreover, all of these studies have used methodologies that are open to criticism.

This study provides new evidence on the relationship between realizations of long-term capital gains and tax rates on capital gains, based on statistical analysis of data for the years 1954 through 1985. The statistical results offer additional support for the view that higher tax rates do lower realizations of capital gains. As a result, increases in tax rates on capital gains produce much less revenue than they would if taxpayers' behavior were unaffected. On the other hand,

simulations using the estimated behavioral responses still show a net revenue increase from the 1986 act. They also indicate that lowering the top rate on long-term capital gains to 15 percent would result in a net revenue loss.

The estimates of the behavioral response contain considerable statistical uncertainty. The proposition that a maximum tax rate of 15 percent would yield more revenue than current law rates cannot be ruled out with certainty, although the probability attached to this result is very low. Similarly, the proposition that revenue from capital gains taxes is maximized at rates far above those of current law also cannot be ruled out.

This report is concerned only with the issue of estimating revenue. Many other factors need to be considered in deciding how to tax capital gains. Arguments for lower tax rates on gains are that they promote saving and investment and channel more resources into new ventures. In addition, a preferential rate on nominal gains provides a rough adjustment for the fact that some gains reflect inflation instead of real increases in purchasing power (though one could directly eliminate the taxation of the inflationary component of gains without introducing a preferential rate). Arguments against reintroducing a differential between long-term and short-term capital gains and ordinary income by lowering the tax rate on capital gains are that the differential would add complexity to the tax system, encourage tax shelter activity, and distort choices among financial instruments and real assets.

PREVIOUS RESEARCH ON REVENUE FROM CAPITAL GAINS TAXES

Previous studies have estimated how much taxpayers change their capital gains realizations in response to a change in the tax rate on those realizations. Those studies use two different approaches: the cross section and the time series. Cross-section studies compare the behavior of taxpayers or taxpayer groups in the same year or over several years. They examine the effect that differences in marginal tax rates among taxpayers have on differences in their capital gains realizations, controlling for the effects of other influences such as dividends, total income, age, and family status. The estimate of the effect of differences in marginal tax rates on differences in realizations is then used to infer how taxpayers would respond if tax rates on capital gains were changed. In contrast, time-series studies examine the effect of differences in marginal tax rates over time on total realizations of gains, again controlling for other influences on realized gains such as real income, wealth, and the price level.

The studies also differ among each other in the data samples they use, the way they define marginal tax rates, the set of other variables included as determinants of gains realizations, and the way they adjust for particular statistical problems. Consequently, they have found a wide range of responses, with very diverse implications for the revenue effects of changing the tax rate on capital gains. The one generally common finding in all of the studies is that higher marginal tax rates lower realizations. In several of the cross-section studies, and in one study that combines cross-section and time-series data, the estimated realizations response is so large that lower tax rates on capital gains increase revenue even if tax rates fall below 20 percent. Other cross-section studies have found much smaller responses. The range of results from time-series studies is narrower; the results of some of the studies imply that lowering tax rates on capital gains from the high level they reached in the mid-1970s increased revenue, but none of them implies that the increase in the top rate from 20 percent to 28 percent in the 1986 act caused a revenue loss.

The statistical estimates in this paper extend previous time-series work to cover the period through 1985. The paper also develops new estimates of average marginal tax rates on capital gains, and examines the realizations of different subgroups of the population.

THE RECENT HISTORY OF CAPITAL GAINS TAXES AND REALIZATIONS

Realizations of long-term capital gains (in excess of net short-term losses) have generally increased with the growth in the economy, rising from $7 billion in 1954 to $165.5 billion in 1985. The growth in realizations was especially rapid in the 1960s and after 1978. The ratio of realized long-term gains to gross national product (GNP) rose from less than 2 percent in 1954 to a peak of 4 percent in 1968, declined to 2 percent in 1975, and then increased sharply after 1978 to 4 percent in 1985. Revenue from capital gains taxes between 1954 and 1983 ranged from 0.3 percent to 0.6 percent of GNP, and from 3 percent to 6 percent of individual income tax revenues. Recently, the share of revenues attributable to capital gains has risen sharply from 4.3 percent in 1982 to 7.3 percent in 1985.

Realizations of long-term capital gains are highly concentrated among the top income groups. In 1984, taxpayers with adjusted gross income (AGI) in excess of $200,000 accounted for over 42 percent of realized gains; taxpayers with income over $100,000 accounted for 54 percent of gains. The share of gains realized by upper-income groups rose when gains were growing rapidly and declined when gains were stable or falling. For example, the top 1 percent of returns ranked by AGI accounted for 50 percent of realized long-term gains in 1968, only 33 percent between 1975 and 1978, and about 55 percent between 1982 and 1985.

It is convenient to divide capital gains taxation over the 1954-1985 interval into three distinct periods: 1954-1969, 1969-1978, and 1979-1985. In the first period, capital gains tax rates were low and stable. Taxpayers were allowed to deduct 50 percent of long-term gains from taxable income. In addition, long-term gains were allowed an alternative tax rate of 25 percent. In the second period, beginning with the Tax Reform Act of 1969 and culminating in the Tax Reform Act of 1976, the Congress restricted the alternative tax and enacted several provisions that reduced the benefits of the 50 percent deduction for capital gains. In the third period (1978-1985), capital gains taxes were substantially reduced. The Revenue Act of 1978 increased the capital gains deduction to 60 percent and removed limits on the use of the deduction. These changes lowered the maximum tax rate on long-term gains from 49 percent to 28 percent. The Economic Recovery Tax Act of 1981 further lowered the top rate on long-term gains to 20 percent.

In general, periods of low capital gains taxation have been associated with high levels of realizations, relative to GNP, and periods of high capital gains taxation with relatively low levels of realizations. Other variables have also been correlated with levels of realizations, however, most notably the level of corporate equity values. Multiple regression analysis can be used to estimate the separate effects of different factors on realizations of capital gains.

STATISTICAL EVIDENCE ON CAPITAL GAINS AND TAXES

Taxpayers may wish to sell income-producing assets and realize capital gains either to rearrange their financial portfolios or to finance additional current consumption or investment in consumer durables (such as houses). The total amount of gains that can be realized for these purposes varies positively with the available stock of accrued gains in taxpayers' portfolios. Realized gains for consumption and investment in consumer durables are likely to vary positively with the level of total economic activity.

The stock of accrued gains on assets subject to the capital gains tax is equal to the difference between total wealth in such assets and their tax basis--that is, their cost to the owners. Accrued gains cannot be observed directly because there are no data on the tax basis of assets. As a proxy for the stock of accrued gains, the study uses measures of wealth.

The investment and consumption motives mentioned above are represented in the study's equations by including the value of corporate equities held by individuals, GNP, the price level, and measures of the marginal tax rate on realized gains; these variables are used to explain the annual level of realizations of net long-term capital gains. Some of the equations include real values of GNP and corporate equities and the price level as separate variables explaining realizations in current dollars; others use real levels of equity and GNP as independent variables to explain realizations of gains in constant dollars. Some equations also test for a cyclical effect by including the rate of change of GNP as well as its level.

Realized gains are found to be positively related to the value of corporate equity holdings, GNP, and the rate of change in GNP, and negatively related to marginal tax rates on gains. The coefficients on the tax rate variable (the realizations response) imply that a one-percentage-point increase in the marginal tax rate on gains (for example, from 19 percent to 20 percent or from 29 percent to 30 percent) reduces realizations of long-term gains by between 3.1 percent and 3.9 percent. These point estimates imply that revenue from capital gains taxes would be maximized at marginal tax rates between 25 percent and 33 percent.

The same estimates were made separately for the top 1 percent and bottom 99 percent of taxpayers, ranked by adjusted gross income. The realizations response estimated for the top 1 percent was almost identical to that for the entire population. The estimate for the bottom 99 percent, however, was much less precise: the realizations response for the bottom 99 percent was not significantly different either from zero or from the estimated response for the top 1 percent.

The estimated responses represent both the long-run and short-run effects of changes in tax rates on realizations, if tax rates in previous years are assumed to have no influence on the current level of realizations. Experiments with lagged tax rate terms failed to reveal a consistent and statistically significant relationship between previous years' tax rates and current gains. But the data may not be adequate to permit identification of complex timing relationships that do actually exist. There are theoretical reasons to suspect that the immediate effect of tax rate changes is greater than the permanent effect. If so, the estimates reported in this paper overstate the long-run effect of tax rate changes on the realizations of gains.

Aside from the timing issue, the estimates of the realizations response are subject to two types of uncertainties. First, the estimates are quite sensitive to changes in the other variables used to explain realizations. Second, even the estimates with a limited number of simple equations reveal a significant standard error in the estimate of the tax rate coefficient--that is, a change in the marginal tax rate could have a wide range of possible responses. A 95 percent confidence interval around the estimates of the realizations response for the entire population shows that a one-percentage-point increase in the marginal tax rate could reduce capital gains realizations by as little as 0.5 percent and by as much as 5.9 percent. The low response implies that any increase in marginal tax rates up to 100 percent would increase revenue, while the high response implies that revenue would be maximized at a rate of only 17 percent.

Simulations of individual tax payments using the most likely estimates of the realizations response all find that the 1986 act will increase revenue from capital gains taxes in the long run, and that lowering the top rate on gains to 15 percent would reduce revenue. The estimated realizations responses from four alternative equations imply that the 1986 act will lead to an annual increase in revenue from capital gains taxes of between $2.6 billion and $5.9 billion compared with previous law; this amount is much less than the increase that would occur if taxpayers were assumed to have no behavioral response, in which case the revenue pickup would be $22.4 billion. Simulations with a 15 percent maximum rate on capital gains show an annual revenue loss of between $3.9 billion and $7.8 billion, compared with current law.

EVALUATION OF FINDINGS

The new statistical results in this study are consistent with previous studies, which found that higher marginal tax rates on capital gains reduced realizations. These results are also broadly consistent with official estimates of the revenue effect of the 1986 act, which showed a revenue pickup from raising capital gains taxes that was much lower than if realizations had been assumed to be fixed. On the other hand, the realizations response estimated in this study is much smaller than the response estimated in some studies concluding that lower tax rates on capital gains would raise revenue. The statistical estimates are sufficiently imprecise, however, that one cannot reject the possibility of such a large response, even though it is not the most likely outcome.

The simulations do not provide any information on how long it may take to adjust to the new revenue levels. In particular, the study does not consider the shifts in realizations between adjacent years that might occur in response to a delay in the effective date of the new law.

Nor does the study consider other behavioral responses that are potentially important. In particular, restoring the preferential treatment of capital gains might reduce other forms of taxable income. For example, it could lower dividend and interest payments by increasing the relative tax advantage of retained earnings, and could raise depreciation deductions by increasing the turnover of real estate. The revenue consequences of such responses have not been estimated in this or any other study; but if they occurred, the revenue loss from lowering the capital gains tax would be greater than indicated by the estimates in this study.

CHAPTER I

INTRODUCTION

In the Tax Reform Act of 1986, the Congress eliminated the 60 percent deduction for long-term capital gains. The intent was to raise revenue to help finance the reduction in tax rates on ordinary income, to preserve distributional neutrality between higher- and lower-income taxpayers, and to simplify the tax system by largely removing distinctions between capital gains and ordinary income and between short-term and long-term capital gains. The elimination of the capital gains deduction more than offset the drop in marginal tax rates, leaving tax rates on realized capital gains higher than under previous law.

The amount of revenue raised by the higher tax rates on capital gains is uncertain because it depends on how realizations will respond to the higher tax rates. If realizations of gains fall substantially, little net revenue may be generated; realizations could even fall so far that revenue is lost under the higher rates.

The uncertainty about realizations exists because taxpayers have considerable discretion over whether and when to pay capital gains taxes. Capital gains are taxed only when the gains are realized by sale or exchange of assets, and gains on assets transferred at death are never taxed. When capital gains tax rates are raised, taxpayers may decide to defer taking gains or even to hold onto assets for as long as they live, passing the accrued gains to their beneficiaries tax free. They may perceive the cost of being "locked in" to existing assets as lower than the tax consequences of selling.

A number of economists have used econometric models to measure how much people alter their realizations of gains in response to tax rate changes. More recently, two studies have used the conclusions of some of the earlier research to simulate the effects of the 1986 act on revenue from capital gains taxes, and have asserted that most academic research supports a conclusion that the capital gains provisions in the 1986 act would reduce revenue.[1] It has also been suggested that lowering the capital gains tax rate to 15 percent would increase revenue.[2] These conclusions have been challenged by other analysts, who have questioned both the methodology used in estimating the taxpayers' response and the application of those results in the revenue simulations.[3]

This study reviews the results of previous studies and presents new evidence on the relationship between capital gains realizations and tax rates, based on recent historical data. Statistical estimates of this relationship are presented for the entire taxpaying population together, and for the top 1 percent and bottom 99 percent of tax returns separately.[4] The new estimates of the realizations response are used to simulate the revenue consequences of the capital gains provisions in the 1986 act, and to estimate the consequences of reducing the maximum tax rate on capital gains to 15 percent.

The revenue comparisons among different tax laws are meant to illustrate differences that might be expected if either current law, pre-1986 law, or post-1986 law with a 15 percent maximum rate on capital gains had been permanently in effect, and do not reflect the effects of short-run adjustment patterns. Therefore, they are not directly comparable to estimates of the five-year effects of the 1986 act or of new proposed legislation that have been prepared as part of the legislative or budget process. What they do illustrate is the steady-state consequences of changing tax rates on capital gains, and the relationship between revenue estimates that assume no behavioral response and estimates that assume the response would be similar to estimated responses to past changes in the tax law.

---

[1] See Lawrence B. Lindsey, "Capital Gains Taxes Under the Tax Reform Act of 1986: Revenue Estimates Under Various Assumptions," *National Tax Journal* (September 1987); and Peat Marwick, "The Revenue Effect of the Increase in the Capital Gains Tax Rate Enacted in the Tax Reform Act of 1986," paper submitted to American Council for Capital Formation, Center for Policy Research (June 1987).

[2] Statement of Mark A. Bloomfield, President of the American Council for Capital Formation, before the Committee on Ways and Means, U.S. House of Representatives, July 8, 1987.

[3] Eric W. Cook and John F. O'Hare, "Issues Relating to the Taxation of Capital Gains," *National Tax Journal* (September 1987), and Jane G. Gravelle, "A Proposal for Raising Revenue by Reducing Capital Gains Taxes?" Congressional Research Service, June 30, 1987.

[4] The top 1 percent of tax returns ranked by adjusted gross income (AGI) account for about half of realized capital gains.

The new results in this paper are not meant to be definitive or final estimates of the response of capital gains realizations and revenue to changes in tax rates on capital gains. As will be shown, the estimates of the tax effect vary depending on how the tax rates and other variables are represented. Because changes in rates and realizations have offsetting effects on revenue, fairly modest uncertainty about the degree of responsiveness of realizations to tax rate changes causes significant uncertainty about revenue effects. In addition, all the econometric studies of capital gains realizations, including this one, must confront serious methodological difficulties. For these reasons, revenue estimators must necessarily supplement conflicting statistical evidence with judgment about how markets are likely to work. Finally, changes in tax rates on capital gains may affect not only realizations, but also other components of the income tax base. For example, if higher capital gains taxes cause companies to pay out a larger share of their profits as taxable dividends, income tax revenues may increase even if revenues from the sale of assets decline.

CHAPTER II

PREVIOUS RESEARCH ON THE REVENUE EFFECT OF CAPITAL GAINS TAXES

A number of earlier studies have estimated how much taxpayers change their capital gains realizations in response to a change in the tax rate on those realizations. This behavioral response is considered the key to the revenue effect. If taxpayers change their realizations little in response to a tax rate change, then an increase in tax rates will raise revenue and a decrease will lose revenue. If taxpayers change their realizations by a large enough amount, the revenue effects will be reversed; an increase in tax rates will then lose revenue and a decrease will raise revenue.

The summary of studies provided here shows a wide range of estimated responses and implied revenue effects. While the studies consistently find that taxes discourage realizations, they disagree as to whether the discouragement resulting from a tax rate increase is large enough to offset the revenue effect. No consensus has emerged as to whether the tax changes enacted in recent years have caused revenues to move in the same direction as the rate changes or in the opposite direction. The studies summarized below, their main features, and their revenue findings are listed in Table 1 at the end of this chapter.

APPROACHES TO ESTIMATING THE REALIZATIONS RESPONSE

Studies that estimate the effect of tax rates on capital gains realizations use two different approaches: the cross section and the time series. Cross-section studies compare the behavior of different taxpayers or taxpayer groups in the same year or over several years. They attempt to explain differences in capital gains realizations among taxpayers by differences in marginal tax rates, while controlling for the effects of other characteristics of taxpayers, such as total income, age, family status, and dividends (used as an indicator of stock ownership). These estimates, based on differences among taxpayers, are then used to infer what might happen to the realizations of all taxpayers if the tax law was changed.

Time-series studies, in contrast, attempt to observe directly the effects of differences in marginal tax rates over time on differences in aggregate capital gains realizations. These studies also control for other variables believed to influence realized gains, such as real income, wealth, and the price level. Some studies attempt to estimate a lag structure--that is, the time pattern of response of realizations to changes in tax rates. Because marginal tax rates differ among taxpayers, all the time-series analyses either use the top rate on capital gains as a proxy for all capital gains rates or construct a marginal tax rate series that represents a weighted average of the rates faced by taxpayers who realize capital gains.

Major methodological problems arise in both approaches. Cross-section studies are able to use a tremendous amount of detailed data on individual taxpayers, but confront a major difficulty in that the group of taxpayers under observation are all facing the same tax law. Consequently, all the differences in tax rates among the units being observed reflect some characteristics of the taxpayers themselves; it is never entirely clear whether the differences in capital gains realizations reflect differences in taxpayer characteristics or are the independent effects of tax rate differences. Other problems in cross-section studies are the commingling of transitory and permanent changes in tax rates, and the limitations in the data provided on tax returns.

Time-series studies overcome the most serious problem in the cross-section studies because they make it possible to identify and measure changes in tax rates over the sample period that are independent of taxpayer behavior. The major problem in the time-series studies is that the number of observations is quite limited. As a result, the estimated relationship between realizations and tax rates is highly dependent on the other factors that are hypothesized to influence capital gains realizations. The limitations in data also make it difficult to identify the time pattern of responses to changes in capital gains taxes. Finally, some biases may result from the need to use aggregate data that combine taxpayers who may have very different behavioral responses. A more complete discussion of methodological problems in studies of the relationship between realizations and tax rates is provided in Appendix B.

MEASURES OF REVENUE EFFECTS

The studies examined here employ three methods of drawing revenue implications from their estimates of the realization response. In one method, the estimated response is applied to a population of taxpayers to simulate directly the revenue consequence of a specific tax change. In the other two, the revenue effects of tax changes are summarized by measures of "tax rate elasticities" or "revenue-maximizing tax rates."

The measure of tax rate elasticity is the percent change in realizations estimated to result from a 1 percent change in tax rates. If a 1 percent increase in tax rates is estimated to cause a 1 percent decline in realizations, then the elasticity is minus one. Revenues would be unchanged because the percentage increase in rates would be just offset by an equal percentage decline in realizations. If the percentage decline in realizations is estimated at less than 1 percent, the absolute value of the elasticity is less than one, and a tax increase would increase revenues.1/ On the other hand, if the percentage decline in realizations is estimated to be greater than 1 percent, the elasticity is greater than one (for example, -1.5 or -3.0), and a tax increase would decrease revenues. Similarly, with a decrease in tax rates, if the absolute value of the elasticity is estimated to be between zero and one, revenues would also decrease; and if the elasticity is estimated to be greater than one, revenues would increase.

While elasticity is a convenient summary, it is not a guide to all situations. Elasticity itself can change with tax rates, with the incomes of taxpayers, and with the mix of assets being realized. An elasticity estimated to be between zero and one at the average tax rate studied might be greater than one at the highest tax rate. Similarly, an elasticity estimated for the highest-income taxpayers might be in-

---

1. Since the elasticity is a negative number, a lower value implies a higher absolute value. That is, if the elasticity is -0.5, it is greater than -1, but its absolute value is less than one. In the following discussion, the use of the term elasticity refers to its absolute value.

appropriate for all taxpayers together, and an elasticity estimated for corporate stocks might be different from that for real estate.

A few studies summarize their revenue effects by calculating a revenue-maximizing tax rate instead of an elasticity. The concept of a revenue-maximizing rate is based on the assumption that the elasticity of realizations with respect to tax rates increases as rates rise. At very low tax rates, the tax may be viewed as inconsequential so that a large percentage tax increase has little effect on realizations and revenues rise (an elasticity between zero and one). At higher tax rates, the tax becomes more consequential and realizations are more affected. At high enough rates, the realizations may be sufficiently affected that any further increase in tax rates causes realizations to decline by a larger percentage than the rate increase (elasticity greater than one). At this point, revenues fall for any further tax rate increase, and thus a revenue-maximizing rate has been reached.

THE STUDIES

The eight studies summarized below differ widely in their attempts to estimate how realizations respond to tax rates. Three use cross-section analysis, three use time-series analysis, one uses both separately, and one combines cross-section and time-series. Some cross-section studies consider only corporate stock sales by high-income taxpayers; others include all taxable asset sales and a representative sample of all taxpayers. Time-series studies, and the combined time-series and cross-section study, differ most in the way they measure average tax rates and the pool of outstanding gains available to be realized.

Feldstein, Slemrod, and Yitzhaki

These authors (FSY) provided one of the first thorough studies of how capital gains realizations respond to changes in tax rates.2/ They applied cross-section analysis to a special sample of 1973 tax returns,

---

2. Martin S. Feldstein, Joel B. Slemrod, and Shlomo Yitzhaki, "The Effects of Taxation on the Selling of Corporate Stock and the Realization of Capital Gains," *Quarterly Journal of Economics*, vol. 94 (June 1980), pp. 777-791.

known as the Capital Assets Study. This data file gives extensive information on asset sales and oversamples high-income returns where asset sales are concentrated. For most of their analysis, FSY limited their sample to tax returns reporting $3,000 or more in dividends.

FSY attempted to explain only realizations of gains on corporate stock. Gains on stock were explained by tax rates on realized gains, dividends, other income, and whether a taxpayer was over 65 years of age.[3] FSY found realized gains on stocks to be highly sensitive to tax rates for those with over $3,000 of dividends, but not for other taxpayers.[4]

For those with over $3,000 in dividends, FSY simulated the revenue effects of two tax changes. One would have capped the rate on capital gains at 25 percent (in 1973, top capital gains rates ranged up to over 45 percent for some taxpayers--see Chapter III). This tax reduction was found to raise revenues. The second proposal would have raised rates on all capital gains by eliminating the exclusion for long-term gains. This tax increase was found to lose revenue. Thus, FSY found revenues moving in the opposite direction of tax rate changes in two cases of fairly large changes in tax rates.

Minarik

Minarik estimated capital gains equations using the same data base as FSY but a different estimating methodology, and reported very different findings.[5] For those with $3,000 or more of dividends, Minarik reported elasticities of -0.44 in one specification and -0.79 in another. These estimates suggest that revenues move in the same direction as a tax rate change on capital gains. Minarik simulated the effect of the rate reductions in the 1978 tax act and found them losing revenue.

---

[3] The marginal tax rate paid on capital gains depends both on the legislated rate structure and on the level of gains a taxpayer chooses to realize. Because the studies seek to estimate the effect of rates on realizations, they take steps to purge their tax rate measure of the effect of differences in realizations. FSY used a predicted rate based on the taxpayer's marginal rate on the first dollar of realizations, and on the last-dollar marginal rate if the taxpayer's realized gains were equal to the average for similar taxpayers.

[4] An earlier study by Feldstein and Yitzhaki had suggested the possibility of a negative relationship between realized gains and tax rates by showing that total stock sales were discouraged by higher tax rates and encouraged by lower tax rates. See Feldstein, Slemrod, and Yitzhaki, "The Effects of Taxation," pp. 781-786, and Martin S. Feldstein and Shlomo Yitzhaki, "The Effect of the Capital Gains Tax on the Selling and Switching of Common Stock," *Journal of Public Economics*, vol. 9 (February 1978), pp. 17-36.

In a subsequent paper, Minarik showed that the main reason for the difference between his and FSY's results was that FSY did not adjust for the oversampling of high-income taxpayers in the Capital Assets Study.[6] Minarik argued that this omission biased FSY's estimated response upward and showed that use of a weighted regression technique produces a much smaller response. FSY replied that their higher estimate resulted from the higher-income taxpayers who are overrepresented in the sample being more responsive to tax rates than others, and were thus able to argue that their estimate is appropriate for evaluating tax changes that primarily affect the very highest-income taxpayers.[7]

One problem common to both the FSY and the Minarik studies was that the data base did not permit them to separate the tax response into temporary and permanent components. Taxpayers facing temporarily low tax rates in a given year because of, for example, above-average business losses, could take advantage of those rates by bunching capital gains realizations in that year. Those taxpayers would not necessarily continue the same level of realizations if capital gains taxes were permanently lowered to this rate. Using only one year's data, neither FSY nor Minarik could distinguish between a transitory response to temporarily lower rates and a response to permanently lower ones, and therefore the estimates in both papers may have overstated the permanent response to a tax change.

---

[5] Joseph J. Minarik, "Capital Gains," in Henry J. Aaron and Joseph A. Pechman, eds., *How Taxes Affect Economic Behavior* (Washington, D.C.: Brookings Institution, 1981).

[6] Joseph J. Minarik, "The Effects of Taxation on the Selling of Corporate Stock and the Realization of Capital Gains: Comment," *Quarterly Journal of Economics*, vol. 99 (February 1984), pp. 93-110.

[7] Martin S. Feldstein, Joel B. Slemrod, and Shlomo Yitzhaki, "The Effects of Taxation on the Selling of Corporate Stock and the Realization of Capital Gains," *Quarterly Journal of Economics*, vol. 99 (February 1984), pp. 114-117; Minarik, "Capital Gains," pp. 255-265.

Auten and Clotfelter

Auten and Clotfelter were able to separate permanent and temporary tax rate responses by using the Treasury Department's Seven-Year Panel of Taxpayers.8/ This data base included all tax returns filed by a sample of the same taxpayers for the years 1967 through 1973. The permanent tax rate was measured as the average of marginal rates over the current and the preceding two years, and the transitory component was the difference between the current and the permanent rate. With this separation, Auten and Clotfelter found a large transitory response and a smaller permanent response. The elasticity for transitory tax changes was greater than one in most specifications, while the elasticity for permanent changes was less than one. Permanent elasticities of -0.37 and -0.55 were reported in two representative equations. These elasticities indicate that revenues would move in the same direction as tax changes, at least for small changes from rates prevailing during the sample period.

The finding of a significant transitory component suggests that the response estimated by FSY probably overstates the permanent response to a tax change. However, Auten and Clotfelter point out that differences between the Capital Assets File and the Seven-Year Panel may also account for differences between their permanent response and the higher response estimated by FSY. First, the Seven-Year Panel combined all realizations together, so the lower permanent response could be partly the result of a lower responsiveness in the sale of assets other than corporate stocks. Second, the panel had too few high-income taxpayers to obtain separate estimates for those with dividends as high as in the earlier studies. Thus, the lower permanent response may also reflect less responsiveness among middle- and lower-income taxpayers, which the previous studies and Auten and Clotfelter all found to be the case.9/

---

8. Gerald E. Auten and Charles T. Clotfelter, "Permanent Versus Transitory Tax Effects and the Realization of Capital Gains," *Quarterly Journal of Economics*, vol. 97 (November 1982), pp. 613-632.

9. Auten and Clotfelter did find limited evidence that higher-income taxpayers are more responsive, but the income classes were all lower than in the earlier studies. Auten and Clotfelter, "Permanent Versus Transitory Tax Effects," p. 629 and footnote 26.

Auten

Auten used time-series data to explain total realized gains of all taxpayers from 1951 to 1980 by the tax rate on capital gains, a constructed measure of unrealized gains, and total AGI other than from capital gains.10/ The measure of the tax rate used was an average marginal capital gains tax rate for taxpayers with over $50,000 of AGI. These taxpayers represent 10 percent or less of all taxpayers but account for a large share of capital gains realizations.11/ In addition to the direct effect of taxes on realizations, Auten included an effect of taxes on asset prices that indirectly affected realizations.12/

Auten found that taxes had statistically significant direct and indirect effects on realizations. About 10 percent of the response of realizations to tax rate changes came through the indirect effect of taxes on asset prices. His simulations showed the tax reductions in the 1978 act gaining revenue but those in the 1981 act losing revenue.

The Treasury Department

As part of a comprehensive study of the effects of the 1978 capital gains tax changes, the Treasury Department analyzed revenue effects of capital gains taxes using both cross-section and time-series models.13/

Treasury's cross-section analysis used a 1971 through 1975 panel of taxpayers and separated out temporary and permanent tax changes. The study found a substantial transitory response, but even so, the permanent elasticity was greater than one. Depending on the

---

10. Gerald E. Auten, "Capital Gains: An Evaluation of the 1978 and 1981 Tax Cuts," in Charls E. Walker and Mark A. Bloomfield, eds., *New Directions in Federal Tax Policy for the 1980s* (Cambridge, Mass.: Ballinger, 1983). The available time-series data on realizations cannot be disaggregated by asset type, so differences in response for corporate stocks, real estate, and other assets have not been explored by Auten or others through time-series analysis.

11. As in other studies, the tax rate was adjusted to avoid reverse influences of realizations on the average tax rate.

12. Auten found that, for example, lower taxes increased the value of corporate stock, which in turn increased realized gains. See Auten, "Capital Gains," p. 136.

13. Office of the Secretary of the Treasury, Office of Tax Analysis, *Report to Congress on the Capital Gains Tax Reductions of 1978* (September 1985), pp. 157-185.

specification, the elasticity for aggregate realizations ranged from -1.16 to -2.20 at taxpayers' marginal tax rates in those years. (The maximum rate on net long-term gains in 1971-1973 ranged from 38 percent to 45.5 percent. See Chapter III.) As all of the estimated elasticities are greater than one, they suggest that revenues would move in the opposite direction of tax rate changes. Treasury explicitly simulated the revenue effects of the capital gains tax reductions in the 1978 and 1981 acts and found both raised revenue.14/ Realizations of gains on corporate stock were found to be more responsive to tax rates than realizations of other assets. The elasticity for realizations of corporate stock was estimated at -2.07 compared with -0.71 for real estate and -0.43 for all other assets.

Treasury's time-series analysis extended Auten's initial study to more recent years, 1954 through 1982, and made several changes. Tax rates were calculated for taxpayers with real incomes of $200,000 or more instead of those with dollar incomes over $50,000. Tax rates in the previous year were also included in case the first-year response to tax changes differed from the longer-term response. Instead of a complex construction of outstanding gains on a variety of assets, Treasury approximated all such gains with two variables--the value of corporate stock and personal income. The value of corporate stock measured gains on a major component of all realized gains, and personal income served as a proxy variable for gains that generally grow with the size of the economy. Inflationary increases in stock values and personal income were allowed to have separate effects on realizations by using real changes in these variables and including a price index. The Treasury model explained changes in realizations from year to year instead of the level in each year.

Treasury's time-series estimates of the effects of the 1978 and 1981 acts were qualitatively similar to the earlier findings of Auten, but differed from Treasury's cross-section results. Simulations found the rate reductions of the 1978 act gaining revenue, but those of the 1981 act losing revenue. These effects held whether or not an indirect effect of taxes on asset values was included. Treasury also found the response in the first year after a tax change to be larger than the long-run response.

---

14. The simulations applied the behavioral responses estimated in the cross-section model to a sample of tax returns for 1979.

Congressional Budget Office

As part of a larger study evaluating the distributional and supply-side effects of the 1981 act, the Congressional Budget Office (CBO) modified the Treasury time-series analysis and extended it through 1983.15/ A constructed average tax rate on gains for all income classes was used for the first time and, as in Auten's study, annual realizations were explained instead of changes from year to year. The elasticity in the first year of a tax change can be calculated to be -0.56 and the elasticity in the second and later years is -0.23. These estimated elasticities suggest that revenues will move in the same direction as tax rates, at least for changes in rates around the average of the post-Korean War experience. The CBO study did not, however, draw any direct conclusions about the revenue effects of changing capital gains taxes. The difference in response between the first and later years was not statistically significant as it had been in the Treasury time-series model.

Cook and O'Hare

Cook and O'Hare also used time-series data through 1983.16/ Their focus was on tax-induced changes in holdings of gains-producing and income-producing assets. Thus, they included the spread between ordinary income tax rates and capital gains tax rates, as well as the level of capital gains rates, in separate equations explaining realized gains and the sum of interest and dividend income. The tax rate on capital gains and the spread were measured at the highest rates in effect for both types of income. As with other studies, the level of tax rates had a negative and statistically significant effect on realizations. In addition, a greater spread was found to increase capital gains realizations, but the effect was not statistically different from zero. Cook and O'Hare did not report elasticities or simulate the revenue effects of their estimates. They did find evidence that an increase in

---

15. Congressional Budget Office, "Effects of the 1981 Tax Act on the Distribution of Income and Taxes Paid," Staff Working Paper (August 1986). The estimates were used to calculate the portion of the rise in reported income of the top 1 percent of taxpayers between 1980 and 1983 that might be attributable to lower capital gains tax rates.

16. Eric W. Cook and John F. O'Hare, "Issues Relating to the Taxation of Capital Gains," *National Tax Journal*, vol. 40 (September 1987), pp. 473-488.

the spread between ordinary income tax rates and capital gains tax rates could reduce interest and dividend income. This is one channel by which a lower capital gains tax rate could reduce the tax base instead of increasing it, as discussed below.

Lindsey

Lindsey combined cross-section and time-series analysis by dividing taxpayers in each year from 1965 through 1982 into six AGI classes.17/ Thus, the comparisons within a year are among classes of taxpayers rather than among individuals as in other cross-section studies. Lindsey explains differences in realizations by differences in tax rates and constructed measures of "tradable wealth," "nontradable wealth," and recent appreciation in tradable wealth. Tradable wealth includes those assets likely to yield capital gains: corporate stock, rental and owner-occupied real estate, and equity in noncorporate businesses.

The study finds realizations to be very sensitive to tax rates. The estimated equations use two functional forms that constrain elasticities to rise with tax rates and facilitate calculation of a revenue-maximizing tax rate. The revenue-maximizing tax rate is found to be between 14 percent and 20 percent. A subsequent simulation by Lindsey using these estimates finds that the 1986 act, which raised maximum rates from 20 percent to 28 percent, loses revenue.18/

Overview

The studies of capital gains realizations and tax rates described above reach different conclusions about the revenue effect of changing capital gains taxes. No consensus exists that a change in tax rates will cause revenues to move in the same or in the opposite direction of the tax change. (See Table 1, at the end of the chapter, for a summary of the main characteristics and findings of each study.)

---

17. Lawrence B. Lindsey, *Capital Gains: Rates, Realizations and Revenues*, Working Paper No. 1893 (National Bureau of Economic Research, Inc., April 1986).

18. Lawrence B. Lindsey, "Capital Gains Taxes Under the Tax Reform Act of 1986: Revenue Estimates Under Various Assumptions," pp. 495-503.

Differences are much wider among the cross-section studies than among the time-series studies. FSY and the Treasury cross-section find realizations so sensitive to tax rate changes that revenues move in the opposite direction of the rate changes. The studies by Minarik and by Auten and Clotfelter find realizations less sensitive to tax rates. Minarik's simulation found a tax rate reduction losing revenue, and Auten and Clotfelter's reported elasticities also suggest revenues would move in the same direction as tax rate changes.

The time-series studies show more consistency, possibly because they all use much the same data. Auten and the Treasury time-series study agree that reductions in tax rates from their high levels before the 1978 act gained revenue, but that the further reductions in the 1981 act lost revenue. The elasticities in the CBO study of the 1981 act suggest that revenues would move in the same direction as tax rates, at least for tax changes around the historical rate structure.

The combined cross-section and time-series results of Lindsey are qualitatively similar to the cross-section results of FSY and Treasury. Realizations are very sensitive to tax rates, and Lindsey's simulations find that the tax rate increase in the 1986 act loses revenue.

In spite of their differences about revenue effects, the studies have some general areas of agreement. Almost all find that tax rate increases discourage realizations. Three of the four cross-section studies test for and find a greater responsiveness to tax rates among higher-income or wealthier taxpayers than among the population in general. The Treasury cross-section study finds that realizations of corporate stock are more sensitive to tax rates than realizations of other assets; this finding is consistent with the high responsiveness for stock sales found by FSY. Two time-series studies suggest that realizations may respond more in the first year of a tax change than in later years.

OTHER REVENUE EFFECTS OF CAPITAL GAINS TAX CHANGES

Changes in capital gains tax rates can affect revenues more broadly than through the response of capital gains realizations. They may cause components of the tax base, or even the size of the economy, to

change. Changes in the tax base caused by changes in capital gains rates could well affect revenues, but induced changes in the size of the economy are not likely to be large enough to affect revenues much, at least in the near term. These broader revenue effects are not incorporated in the empirical findings summarized above, although they are discussed in the Treasury study, the study by Cook and O'Hare, and Gravelle's review of Lindsey's research.19/

Other types of property income are the components of the tax base that are most likely to be affected by changes in capital gains tax rates. For example, an increase in capital gains tax rates that discourages realizations could also encourage corporations to increase dividend payouts and rely more on debt financing than retained earnings. Higher dividend and interest payments would raise individual income tax revenues. More generally, any substitution of ordinary income for capital gains would increase revenue as long as the tax rate on ordinary income was greater than the tax rate on capital gains before the increase. Cook and O'Hare found limited evidence of these other changes in the tax base.20/ They found that the spread between tax rates on ordinary income and on long-term capital gains significantly influences the level of dividend and interest income received by taxpayers.

The overall effect on the tax base of changes in capital gains tax rates has not, however, been estimated in any systematic way. A more complete discussion of the types of revenue feedbacks that might be expected is provided in Chapter IV.

---

19. Jane G. Gravelle, "A Proposal for Raising Revenue by Reducing Capital Gains Taxes?".

20. Cook and O'Hare, "Issues Relating to the Taxation of Capital Gains," pp. 485-487.

TABLE 1. SUMMARY OF PREVIOUS STUDIES ON REVENUE EFFECTS OF CAPITAL GAINS TAXES

Authors	Data	Special Features	Size of Tax Rate Response	Revenue Effects
Feldstein, Slemrod, Yitzhaki	CROSS SECTION of individual taxpayers in 1973 Includes taxpayers with over $3,000 of dividends Limited to realizations on stocks	No weighting in a sample over-representing taxpayers with highest incomes	Large response Larger response at higher AGI Elasticity not reported	Reducing top rate increases revenue on stock sales Removing exclusion loses revenue
Minarik	CROSS SECTION, same as Feldstein, Slemrod, Yitzhaki	Weighted to reflect population of taxpayers Includes more nontax influences on realizations than other studies	Elasticities of -0.44, -0.79 Higher elasticity at higher incomes	1978 tax reductions lose revenue on stock sales
Auten and Clotfelter	CROSS SECTION on individual taxpayers, panel data 1967-1973 Represents taxpayers with over $200 in dividends or rents and $5,000 in AGI less gains Includes all reported asset sales	Separate responses to temporary and permanent tax changes	Permanent elasticities of -0.37 and -0.55 Higher elasticity at higher incomes Temporary response larger than permanent response	No simulations Long-run revenues likely to move with tax rate changes because elasticity between 0 and -1
Auten	TIME SERIES on taxpayer totals and aggregate economic data, 1951-1980	Tax rate is predicted average for taxpayers with AGI over $50,000 Revenue prediction includes indirect effect of capital gains taxes on asset values	Elasticity not reported	1978 tax reduction raises revenue but 1981 reduction loses revenue

(Continued)

TABLE 1. Continued

Authors	Data	Special Features	Size of Tax Rate Response	Revenue Effects
Treasury	CROSS SECTION on individual taxpayers, panel data 1971-1975 Represents all taxpayers and all asset sales	Estimates responses to permanent and temporary tax changes, and responses of different asset types	Permanent elasticities of -1.16 to -2.20 for all assets -2.07 for stocks, -0.73 for real estate, -0.43 other assets	1978 and 1981 tax reductions raise revenue
Treasury	TIME SERIES on taxpayer totals and aggregate economic data, 1954-1982	Tax rate is predicted average for taxpayers with real AGI over $200,000	Elasticity not reported First year's response greater than later years'	1978 tax reduction raises revenue but 1981 reduction loses revenue
CBO Study of 1981 Tax Act	TIME SERIES on taxpayer totals and aggregate economic data, 1954-1983	Tax rate is predicted average for all taxpayers	Elasticities estimated as -0.56 first year, -0.23 later	No revenue effect reported, but elasticities suggest revenues would change in same direction as tax rates
Cook and O'Hare	TIME SERIES on taxpayer totals and aggregate economic data, 1954-1983	Includes spread between tax rates on ordinary income and capital gains	Elasticity not reported Spread marginally important for capital gains	Not reported
Lindsey	Combined CROSS SECTION and TIME SERIES on six AGI classes of taxpayers, 1965-1982	Tax rate per class is unweighted average Distributes aggregate economic data among AGI classes	Estimated coefficients imply revenue-maximizing tax rates between 14 percent and 20 percent	1986 tax increases will reduce revenue

SOURCE: Congressional Budget Office.

CHAPTER III

CAPITAL GAINS TAXES AND REALIZATIONS, 1954-1985

This chapter reviews the history of capital gains taxation and realizations of capital gains for the post-Korean War period. For background purposes, the chapter begins with a brief discussion of the distribution of realized capital gains among income groups. It then presents data on changes over time in the amount and distribution of realized capital gains and revenue from capital gains taxes. These changes in capital gains are compared with changes in the tax treatment of capital gains and with changes in other economic variables.

DISTRIBUTION OF GAINS AMONG INCOME GROUPS

Realizations of capital gains are highly concentrated among the top income groups (see Table 2). In 1984, taxpayers with adjusted gross income (AGI) of $1 million or more (0.01 percent of all returns) accounted for over a fifth of net long-term gains (in excess of net short-term losses).1/ In contrast, they received only 1 percent of total AGI from other sources. Taxpayers with AGI of $200,000 or greater (about the top quarter of 1 percent of returns) accounted for 42 percent of all gains and 4 percent of other AGI. Taxpayers with AGI of $100,000 or more (the top percentile of returns) accounted for 54 percent of gains and about 9 percent of other AGI.

---

1. To qualify as long term under current law, an asset must be held for at least one year. Before 1977, the holding period was six months. The Tax Reform Act of 1976 increased the holding period for defining capital transactions as long term from six months to one year; the Tax Reform Act of 1984 reinstated the six-month holding period for transactions between December 22, 1984, and January 1, 1988.

   In computing net gains eligible for the capital gains deduction (50 percent of net capital gains before October 31, 1978, and 60 percent between October 31, 1978, and January 1, 1987), the taxpayer would subtract from long-term gains all long-term losses and also would subtract the excess of short-term losses over short-term gains. The gains figures in Table 2 and the other tables in this chapter report the resulting amount of net long-term gains in excess of net short-term losses for taxpayers for whom this figure was positive. Net short-term gains are not shown because they have never been eligible for the capital gains deduction.

Realized capital gains are also significant for taxpayers with zero or negative amounts of AGI. Taxpayers with AGI less than or equal to zero accounted for about 15 percent of all long-term realizations among taxpayers with AGI less than $100,000. These taxpayers are clearly not low-income people in the usual sense. They hold substantial assets and realize large amounts of gains per return, and therefore must have negative AGI from other sources. The most common sources of negative AGI are losses from proprietorships, partnerships, and farms. These losses in many cases represent the effects of tax preferences, such as expensing and accelerated depreciation, instead of real economic losses.

Previous research has also shown that reported capital gains are more concentrated among the high-income groups than are taxable

TABLE 2. DISTRIBUTION OF LONG-TERM CAPITAL GAINS BY ADJUSTED GROSS INCOME (AGI): 1984

AGI Class (In thousands of dollars)	Share of Long-Term Capital Gains (In percents)	Share of AGI Excluding Capital Gains (In percents)	Share of Tax Returns (In percents)
Less than 0	7.11	-1.80	1.01
0 - 5	0.92	2.05	16.33
5 - 10	1.64	5.87	16.54
10 - 15	2.39	8.31	14.14
15 - 20	3.13	9.51	11.55
20 - 25	2.51	9.44	8.87
25 - 30	1.95	10.00	7.68
30 - 40	4.96	18.32	11.14
40 - 50	4.94	12.59	6.00
50 - 75	9.54	12.94	4.68
75 - 100	6.31	4.11	1.06
100 - 200	12.15	4.47	0.77
200 - 500	12.96	2.40	0.20
500 - 1,000	8.19	0.72	0.03
1,000 or more	21.30	1.06	0.01
Total	100.00	100.00	100.00

SOURCE: Congressional Budget Office, computed from data reported in Internal Revenue Service, *Statistics of Income, Individual Income Tax Returns 1984*.

interest and dividends, and that the gains were also highly concentrated at the top in earlier years. A portion of the concentration of gains at the top reflects the temporary movement of taxpayers into high-AGI groups in years in which they realize large gains. Using panel data, however, the Treasury showed that permanent capital gains (defined as gains averaged over a five-year period) are also highly concentrated among taxpayers with high permanent AGI.2/

Finally, capital gains shown on tax forms (and reported in Table 2) overstate positive real income because the tax system does not adjust for the increase in the general price level between the time assets are bought and the time they are sold. To compute the real gain on the sale of an asset, one must adjust the tax basis--that is, the purchase price--for the increase in the general price level over the period the asset was held. Previous research has revealed that, in 1973 and 1977, the distribution of real gains on sales of corporate stock and nonbusiness real estate was even more highly concentrated among the highest-income groups than was the distribution of nominal gains. Indeed, for sales of corporate stock in 1977, total real gains were negative in the aggregate and for all groups with AGI less than $100,000, but were positive for AGI groups over $100,000.3/ Data that can be used to compute real gains of assets sold in years after 1977 are not publicly available.

The extreme concentration of realized gains at the top of the income distribution suggests that the revenue effect of changes in the taxation of capital gains is influenced heavily by the behavior of the highest-income taxpayers. As discussed in Chapter II, earlier cross-section studies have found evidence that higher-income taxpayers respond more to tax changes than others. In particular, because the 1986 Tax Reform Act raised capital gains tax rates by a much larger proportionate amount for lower- and middle-income taxpayers than for the highest-income groups, it is worthwhile to examine through time-series analysis whether the behavioral response might differ

---

2. Office of the Secretary of the Treasury, Office of Tax Analysis, *Report to Congress on the Capital Gains Tax Reductions of 1978* (September 1985). The Treasury used panel data that followed returns of the same taxpayers for a five-year period.

3. Ibid. A similar result for 1973 is found in Martin S. Feldstein and Joel B. Slemrod, "Inflation and the Excess Taxation of Gains on Corporate Stock," *National Tax Journal* (June, 1978).

among income groups.4/ This issue is considered in the econometric work presented in Chapter IV.

GROWTH IN CAPITAL GAINS REALIZATIONS OVER TIME

Realizations of long-term capital gains have increased greatly since 1954, with very rapid growth occurring in the 1960s and between 1978 and 1985. In 1985, the latest year for which data are available, long-term realizations of capital gains were $165.5 billion, compared with $7.0 billion in 1954 and $48.9 billion in 1978.

Capital gains realizations might be expected to grow in proportion to the level of total accrued gains. Total accrued capital gains cannot be directly measured, but are likely to follow overall growth in the economy and in the value of corporate equities.

In general, the growth in realized capital gains has moved upward with the overall growth of GNP (Table 3 and Figure 1). Capital gains generally increased faster than GNP in the 1950s and 1960s, reaching a peak of 4 percent of GNP in 1968. Gains declined sharply relative to GNP in the 1969-1970 recession and again following the decline of the dollar and the increase in oil prices in 1973, falling to 1.9 percent of GNP in the recession year 1975. After 1975, capital gains began to increase more rapidly than GNP, with a big jump in 1979 and subsequent large increases in 1984 and 1985. Capital gains as a share of GNP almost doubled between 1978 and 1985, rising from 2.2 percent to 4.1 percent, an amount just above the share reached in 1968.

---

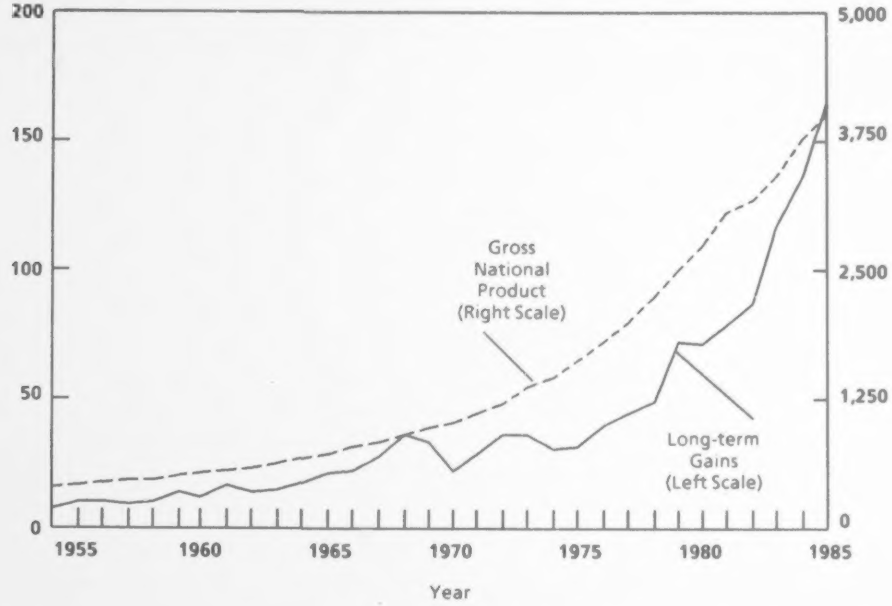
4. For example, for a married couple with taxable income of $30,000 in 1988, the marginal tax rate on ordinary income was lowered by the 1986 act from 32 percent to 28 percent, while the marginal tax rate on long-term gains was increased from 12.8 percent to 28 percent--an increase of 219 percent. In contrast, for a married couple with income greater than $200,000, the marginal tax rate on ordinary income dropped from 50 percent to 28 percent, while the rate on long-term gains increased from 20 percent to 28 percent--an increase of 40 percent.

TABLE 3. REALIZED NET LONG-TERM GAINS COMPARED WITH GROSS NATIONAL PRODUCT, 1954-1985

Year	Realizations of Net Long-Term Gains (In billions of dollars)	Gross National Product (In billions of dollars)	Ratio of Gains to GNP (In percents)
1954	7.0	372.5	1.9
1955	9.7	405.9	2.4
1956	9.6	428.1	2.2
1957	8.2	451.0	1.8
1958	9.3	456.8	2.0
1959	12.9	495.8	2.6
1960	11.7	515.3	2.3
1961	15.7	533.8	2.9
1962	13.6	574.6	2.4
1963	14.5	606.9	2.4
1964	17.0	649.8	2.6
1965	20.8	705.1	3.0
1966	21.8	772.0	2.8
1967	27.3	816.4	3.3
1968	35.8	892.7	4.0
1969	32.6	963.9	3.4
1970	21.3	1,015.5	2.1
1971	28.2	1,102.7	2.6
1972	36.1	1,212.8	3.0
1973	35.8	1,359.3	2.6
1974	30.0	1,472.8	2.0
1975	30.7	1,598.4	1.9
1976	39.2	1,782.8	2.2
1977	44.4	1,990.5	2.2
1978	48.9	2,249.7	2.2
1979	71.3	2,508.2	2.8
1980	70.8	2,732.0	2.6
1981	78.3	3,052.6	2.6
1982	87.1	3,166.0	2.8
1983	117.3	3,405.7	3.4
1984	135.9	3,765.0	3.6
1985	165.5	3,998.1	4.1

SOURCES: Congressional Budget Office, computed from published data of the Internal Revenue Service and the Department of Commerce, Bureau of Economic Analysis.

Figure 1.
Realized Net Long-Term Gains and Gross National Product, 1954-1985 (In billions of dollars)



SOURCES: Congressional Budget Office, computed from published data of the Internal Revenue Service and the Department of Commerce, Bureau of Economic Analysis.

Capital gains realizations have also tended to grow with the value of corporate equities held by households (Table 4 and Figure 2).5/ Household equity values have grown more rapidly than GNP since 1978, which could account for some of the growth in realizations relative to GNP in recent years. Realizations since 1978, however, have grown faster than household equity values, reaching historical peaks of 8 percent to 9 percent of equity values in 1979, 1983, 1984, and 1985.

---

5. The value of corporate equities held by households differs from an index of stock prices in two respects. First, it reflects changes in the number of shares, as well as changes in the price per share. Second, it reflects the long-term secular decline in the ratio of corporate equities held by households to those held by pension funds. The latter are not subject to tax.

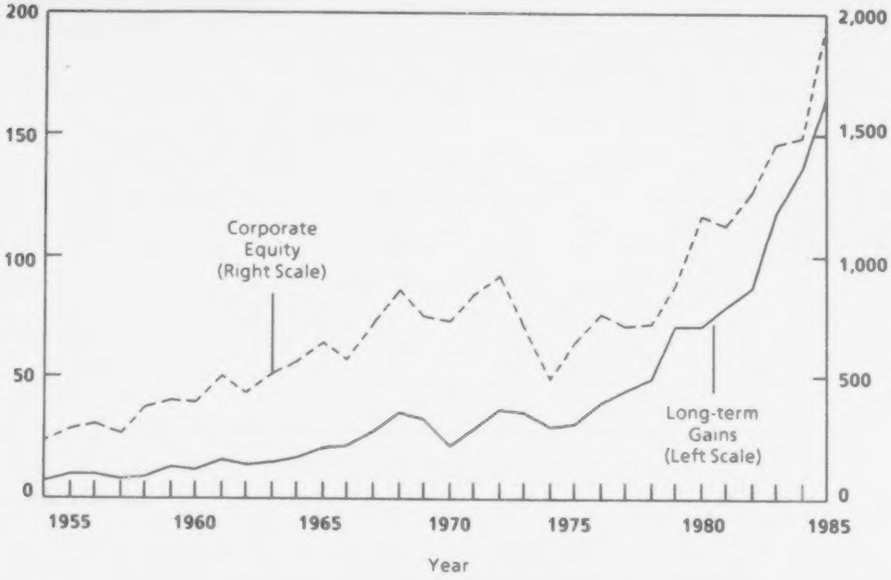
TABLE 4. REALIZATIONS OF NET LONG-TERM GAINS COMPARED WITH CORPORATE EQUITY HELD BY INDIVIDUALS, 1954-1985

Year	Realizations of Net Long-Term Gains (In billions of dollars)	Corporate Equity (In billions of dollars)	Ratio of Gains to Equity (In percents)
1954	7.0	235.0	3.0
1955	9.7	286.3	3.4
1956	9.6	305.1	3.1
1957	8.2	267.4	3.1
1958	9.3	373.3	2.5
1959	12.9	402.0	3.2
1960	11.7	395.5	3.0
1961	15.7	500.8	3.1
1962	13.6	437.4	3.1
1963	14.5	513.9	2.8
1964	17.0	564.7	3.0
1965	20.8	635.6	3.3
1966	21.8	575.6	3.8
1967	27.3	720.4	3.8
1968	35.8	857.9	4.2
1969	32.6	746.1	4.4
1970	21.3	728.6	2.9
1971	28.2	832.8	3.4
1972	36.1	920.6	3.9
1973	35.8	709.7	5.0
1974	30.0	494.4	6.1
1975	30.7	641.0	4.8
1976	39.2	754.1	5.2
1977	44.4	708.8	6.3
1978	48.9	721.3	6.8
1979	71.3	872.5	8.2
1980	70.8	1,166.7	6.1
1981	78.3	1,120.3	7.0
1982	87.1	1,265.7	6.9
1983	117.3	1,454.2	8.1
1984	135.9	1,490.7	9.1
1985	165.5	1,948.0	8.5

SOURCES: Congressional Budget Office, computed from published data of the Internal Revenue Service and the Board of Governors of the Federal Reserve System.

NOTE: Mutual funds are included in the measure of corporate equity because the gains realized on their transactions are taxed to households, but the value of equities held for households by pension funds is excluded because the realization of capital gains by pension funds is not subject to tax at either the entity or household level.

Figure 2.
Realized Net Long-Term Gains and Corporate Equity of Households, 1954-1985 (In billions of dollars)



SOURCES: Congressional Budget Office, computed from published data of the Internal Revenue Service and the Board of Governors of the Federal Reserve System.

The volatility of capital gains realizations has been greater for the top income groups than for taxpayers as a whole (see Table 5 and Figure 3). During the 1970s, the ratio of realized gains to income for the top 0.25 percent of taxpayers, ranked by AGI, fell to about one-third of its 1968 peak; the same ratio declined to only about two-thirds of its 1968 peak for the bottom 99 percent of taxpayers.6/ After 1978, the growth in realizations as a share of GNP was much greater for the top 1 percent (and top 0.25 percent) of returns than for the bottom 99 percent.

Consequently, the share of realized gains in the top 0.25 percent, which ranged from 33 percent to 39 percent over the 1954 through

---

6. The division of the taxpaying population into percentiles of AGI is based on an interpolation of published data on realizations by AGI group in the Internal Revenue Service publication, *Statistics of Income*.

TABLE 5. RATIO OF REALIZED NET LONG-TERM GAINS TO GROSS NATIONAL PRODUCT, BY INCOME GROUP, 1954-1985

Year	Top 0.25 Percent of Returns (In percents)	Top 1 Percent of Returns (In percents)	Bottom 99 Percent of Returns (In percents)
1954	0.7	1.0	0.9
1955	0.9	1.3	1.1
1956	0.8	1.2	1.1
1957	0.6	0.9	1.0
1958	0.7	1.0	1.1
1959	0.9	1.3	1.3
1960	0.8	1.1	1.2
1961	1.1	1.5	1.4
1962	0.8	1.1	1.2
1963	0.8	1.1	1.3
1964	1.0	1.2	1.4
1965	1.1	1.4	1.6
1966	0.9	1.2	1.6
1967	1.2	1.5	1.8
1968	1.5	2.0	2.0
1969	1.2	1.6	1.8
1970	0.7	0.9	1.2
1971	0.8	1.1	1.4
1972	1.0	1.4	1.6
1973	0.7	1.1	1.6
1974	0.5	0.8	1.3
1975	0.4	0.7	1.3
1976	0.5	0.7	1.5
1977	0.5	0.8	1.5
1978	0.5	0.7	1.5
1979	0.9	1.2	1.6
1980	0.8	1.1	1.4
1981	0.9	1.2	1.4
1982	1.2	1.5	1.2
1983	1.4	1.8	1.6
1984	1.5	2.0	1.6
1985	1.7	2.3	1.8

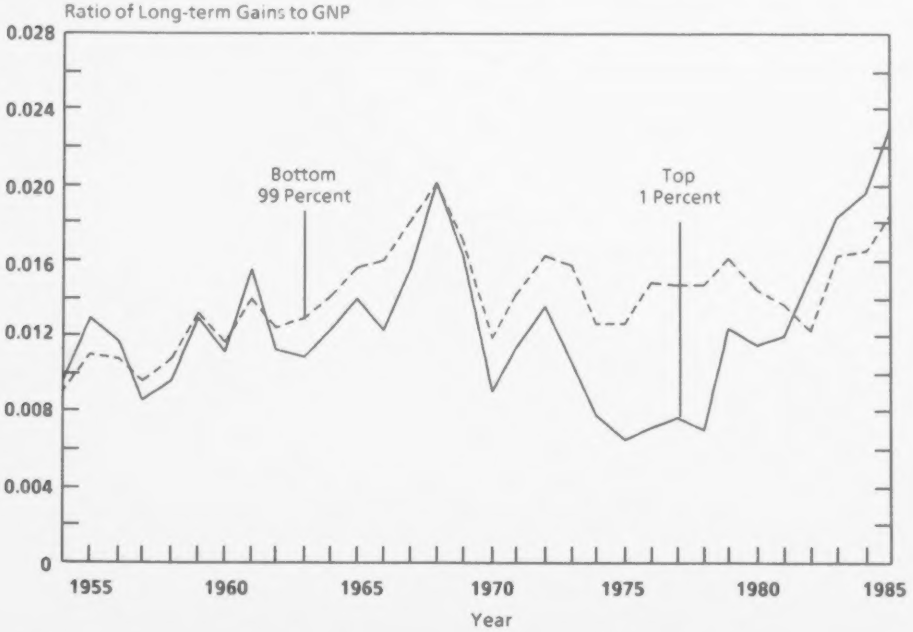
SOURCES: Congressional Budget Office, computed from published data of the Internal Revenue Service and the Department of Commerce, Bureau of Economic Analysis.

1968 period, declined to a low of 21 percent in 1978, and then increased to between 40 percent and 42 percent in 1982 through 1985 (see Table 6). The share of realized gains in the top 1 percent was around 50 percent for most of the 1950s and 1960s, dropping in the 1970s to a low of 32 percent in 1978, and then increasing to around 55 percent in 1982-1985.

RECENT HISTORY OF CAPITAL GAINS TAXATION

In recent years, changes in a number of provisions of the tax law have affected the taxation of long-term capital gains. These changes include those made in:

Figure 3.
Ratio of Realized Long-Term Gains to Gross National Product, by Income Group, 1954-1985



SOURCES: Congressional Budget Office, computed from published data of the Internal Revenue Service and the Department of Commerce, Bureau of Economic Analysis.

TABLE 6. SHARE OF REALIZATIONS OF NET LONG-TERM GAINS BY THE HIGHEST-INCOME GROUPS, 1954-1985

	Realized Net Long-Term Gains by Top 1 Percent of Returns		Realized Net Long-Term Gains by Top 0.25 Percent of Returns	
Year	Amount (In billions of dollars)	Share (In percents)	Amount (In billions of dollars)	Share (In percents)
1954	3.6	51.2	2.6	36.9
1955	5.2	54.1	3.7	38.4
1956	5.0	52.1	3.6	37.5
1957	3.9	47.2	2.7	32.7
1958	4.4	47.0	3.0	32.5
1959	6.4	49.5	4.6	35.5
1960	5.7	48.8	4.2	35.6
1961	8.2	52.5	6.1	38.8
1962	6.5	47.8	4.9	35.8
1963	6.6	45.7	5.0	34.6
1964	7.9	46.6	6.3	36.7
1965	9.9	47.3	7.7	37.2
1966	9.4	43.4	7.3	33.7
1967	12.6	46.2	9.7	35.4
1968	17.9	50.0	13.2	37.0
1969	15.7	48.1	12.0	36.8
1970	9.2	43.3	6.7	31.5
1971	12.5	44.4	9.1	32.1
1972	16.4	45.4	11.7	32.2
1973	14.4	40.4	10.0	28.1
1974	11.4	38.0	7.5	24.9
1975	10.4	34.0	7.0	22.7
1976	12.7	32.4	8.8	22.4
1977	15.1	34.1	10.5	23.6
1978	15.8	32.2	10.5	21.4
1979	31.1	43.6	22.5	31.5
1980	31.3	44.3	22.0	31.1
1981	36.7	46.9	26.5	33.8
1982	48.1	55.2	37.3	42.8
1983	62.1	52.9	47.4	40.4
1984	73.9	54.3	57.6	42.8
1985	92.0	55.6	69.9	42.2

SOURCE: Congressional Budget Office, computed from published data of the Internal Revenue Service.

- The general structure of marginal rates and the level of personal exemptions and standard deductions;
- The percentage of net long-term gains that may be deducted in computing taxable income;
- Provisions that have allowed taxpayers to use an alternative tax rate for capital gains that, for some taxpayers, was lower than the marginal rate multiplied by the percentage of gains included in taxable income;
- Provisions that imposed minimum taxes on preference income, including the untaxed portion of long-term capital gains, and that reduced the benefits of the maximum tax on earned income for taxpayers with preferentially taxed gains; and
- The holding period determining when a gain is eligible for long-term treatment.

All of these changes have influenced the effective tax rate on realizations of long-term gains.

The fluctuations of gains between 1954 and 1985 have to some degree mirrored the changes in tax rates applied to gains. Basically, capital gains taxation has gone through three distinct periods in the 1954 through 1985 interval.7/ The first, which lasted until the Tax Reform Act of 1969 and maintained capital gains provisions that had been in effect since 1942, was marked by low and relatively stable tax rates on capital gains. The second period, between 1969 and 1978, was marked by high and rising effective tax rates on capital gains enacted in the 1969 act and the Tax Reform Act of 1976. The third period, between 1978 and 1985, was characterized by low and declining tax rates on capital gains enacted in the Revenue Act of 1978 and the Economic Recovery Tax Act of 1981. A new era, marked by higher rates on capital gains than in the recent past, and historically low rates on ordinary income, is now beginning, following the 1986 act.

---

7. A full description of these changes is provided in Office of the Secretary of the Treasury, Office of Tax Analysis, *Capital Gains Tax Reductions*, pp. 29-39.

1954-1969

Between 1954 and 1969, 50 percent of long-term capital gains was deductible in computing taxable income. Absent other provisions, this deduction would have made the top rate on capital gains equal to 45.5 percent (half of 91 percent) before the tax cuts enacted in the Revenue Act of 1964, and 35 percent (half of 70 percent) after the 1964 act was fully phased in. In addition, however, long-term capital gains were allowed an alternative tax rate of 25 percent. In general, the maximum marginal tax rate on capital gains was 25 percent.[8]

In 1968, the Congress enacted a 10 percent surtax to help finance the Vietnam war. The surtax was in effect between April 1, 1968, and April 1, 1970, and raised tax liability by 7.5 percent in 1968, 10 percent in 1969, and 2.5 percent in 1970. It raised the maximum marginal tax rate on capital gains to 26.875 percent in 1968 and 27.5 percent in 1969.

1969-1976

The Tax Reform Act of 1969 included three major provisions affecting long-term capital gains. First, it phased out the alternative tax over a three-year period for taxpayers with gains over $50,000. Removal of the limit on the alternative tax by itself raised the maximum tax rate on capital gains to 35 percent by 1972. Second, the act introduced an add-on minimum tax on tax preference income above a specified exemption. The untaxed half of long-term capital gains was counted as a preference in computing the minimum tax. Finally, it introduced a new maximum tax of 50 percent on "earned income," compared with 70 percent on "unearned income," but provided that the benefits of the maximum tax be reduced by 50 cents for every dollar of tax preference income. This "poisoning" of the maximum tax also increased the tax rate on long-term capital gains for some taxpayers.

---

[8] Some taxpayers could have confronted a marginal tax rate slightly higher than 25 percent. If a taxpayer was in a higher than 50 percent bracket with capital gains, but less than a 50 percent bracket with no capital gains, use of the alternative tax would mean forgoing some of the inframarginal benefits of lower statutory tax rates. See Lawrence B. Lindsey, *Capital Gains: Rates Realizations and Revenues*, Working Paper No. 1893 (National Bureau of Economic Research, Inc., April 1986).

The effect of these provisions was to increase the marginal tax rate on long-term capital gains to 35 percent for taxpayers in the top income bracket, to 36.5 percent for taxpayers in the top income bracket subject to the minimum tax, and to 45.5 percent for taxpayers in the top income bracket affected by both the minimum tax and the poisoning of the maximum tax.

The 1976 act further increased the taxation of capital gains by increasing the rate of the minimum tax and reducing deductions from the minimum tax. These changes raised the maximum tax rate on long-term gains to 39.875 percent for taxpayers in the 70 percent bracket and subject to the minimum tax and to a theoretical maximum rate of 49.125 percent for taxpayers subject to the minimum tax and also affected by the poisoning of the maximum tax. (In practice, few taxpayers actually faced a 49 percent rate.) In addition, the 1976 act increased the holding period required for a gain to be considered "long-term" from 6 months to 9 months in 1977 and 12 months in 1978 and succeeding years.

1978-1985

The 1978 act substantially lowered the taxation of long-term capital gains. It ended the "poisoning" of the maximum tax and removed the capital gains preference from the base of the add-on minimum tax.[9] The long-term capital gains deduction was increased from 50 percent to 60 percent. Finally, the alternative tax on capital gains was eliminated. The combined effect of these provisions was to lower the maximum marginal tax rate on long-term gains to 28 percent.

The 1981 act reduced the top rate on ordinary income from 70 percent to 50 percent, effective January 1, 1982. This change by itself lowered the maximum tax rate on capital gains to 20 percent. A special provision of the 1981 act made the 20 percent maximum rate on long-term capital gains effective for gains realized after June 20, 1981. The 1981 act also generally lowered marginal tax rates across the board over a three-year period, thereby reducing capital gains tax rates for taxpayers below the top income group. The Tax Reform Act of 1984 reduced the holding period to six months for gains realized between December 22, 1984, and January 1, 1988.

---

[9] To substitute for the add-on minimum tax on gains, the 1978 act introduced an alternative minimum tax with a maximum tax rate of 25 percent. The maximum rate on the alternative minimum tax was lowered to 20 percent in 1981.

The Tax Reform Act of 1986

The 1986 act eliminated the capital gains deduction, while at the same time reducing marginal tax rates on ordinary income. For 1987, the maximum tax rate on capital gains was 28 percent. For the years after 1987, the marginal tax rate on long-term capital gains is the same as the rate on ordinary income. For taxpayers with the highest incomes, the maximum rate is 28 percent, the same as the rate in effect after the 1978 tax reduction. For taxpayers just below the highest incomes, the effective marginal tax rate on both ordinary income and capital gains is 33 percent because these taxpayers lose the benefits of the 15 percent bracket and personal exemptions at a rate of 5 cents per dollar of additional income.

Eliminating the capital gains deduction affects other features of capital gains taxation. The holding period for determining long-term gains becomes much less important because both net short-term and net long-term gains are taxed at the same rate. This change removes the incentive to delay realization of gains until they become long-term and also removes an incentive to claim short-term losses. Because the preference for long-term capital gains is eliminated, long-term gains are no longer affected by the alternative minimum tax. Finally, the 1986 act significantly increased marginal rates on long-term capital gains for low- and middle-income taxpayers, because these taxpayers receive little or no reduction in statutory marginal tax rates on ordinary income. (The reductions in individual tax liability at the bottom of the income distribution resulted mainly from increases in personal exemptions and the standard deduction.)

Trends in Marginal Tax Rates

The maximum marginal tax rate on long-term gains was 25 percent between 1954 and 1967. It increased slightly in 1968 and 1969 with the Vietnam War surtax, and increased in several steps between 1969 and 1978 as a result of the 1969 act and the 1976 act (see Table 7). The

TABLE 7. MAXIMUM MARGINAL TAX RATE ON CAPITAL GAINS, 1954-1988 (In percents)

Year	Ordinary or Alternative Tax	Ordinary or Alternative Plus Minimum Tax	Ordinary or Alternative Plus Minimum Plus Maximum Tax
1954	25.0	25.0	25.0
1955	25.0	25.0	25.0
1956	25.0	25.0	25.0
1957	25.0	25.0	25.0
1958	25.0	25.0	25.0
1959	25.0	25.0	25.0
1960	25.0	25.0	25.0
1961	25.0	25.0	25.0
1962	25.0	25.0	25.0
1963	25.0	25.0	25.0
1964	25.0	25.0	25.0
1965	25.0	25.0	25.0
1966	25.0	25.0	25.0
1967	25.0	25.0	25.0
1968	26.9	26.9	26.9
1969	27.5	27.5	27.5
1970	30.2	32.3	32.3
1971	32.5	34.3	38.8
1972	35.0	36.5	45.5
1973	35.0	36.5	45.5
1974	35.0	36.5	45.5
1975	35.0	36.5	45.5
1976	35.0	39.9	49.1
1977	35.0	39.9	49.1
1978	33.8	39.0	48.3
1979	28.0	28.0	28.0
1980	28.0	28.0	28.0
1981	23.7	23.7	23.7
1982	20.0	20.0	20.0
1983	20.0	20.0	20.0
1984	20.0	20.0	20.0
1985	20.0	20.0	20.0
1986	20.0	20.0	20.0
1987	28.0	28.0	28.0
1988	28.0	28.0	28.0

SOURCE: Compiled by Congressional Budget Office. See also Office of the Secretary of the Treasury, Office of Tax Analysis, *Report to Congress on the Capital Gains Tax Reductions of 1985* (September 1978).

NOTES: In 1978, the maximum rate was reduced from 35 percent to 28 percent for gains realized after October 31, 1978.

In 1981, the maximum rate was reduced from 28 percent to 20 percent for gains realized after June 20, 1981.

The 28 percent rate in 1988 applies to the highest-income group. For taxpayers with income in the range in which the benefits of personal exemptions and the 15 percent rate are phased out, the marginal tax rate on capital gains is 33 percent.

maximum rates then declined in 1978 and 1981, reaching a low point of 20 percent for 1982 through 1986. The maximum rate was increased to 28 percent in 1987.

The average marginal rate on long-term gains for all returns differs from the maximum rate because most taxpayers are not in the top rate bracket and because taxpayers with small amounts of gains and/or low marginal tax rates were exempt from limits on the alternative tax, the add-on minimum tax, and the poisoning of the maximum tax in years when those provisions were in effect. The average marginal rate on capital gains can change even when the maximum rate is not changing, for several reasons. First, legislated changes in the structure of marginal tax rates on ordinary income alter the tax rates on capital gains in lower brackets by different amounts than the maximum rate. Second, increases in nominal income move taxpayers below the very top income groups into higher marginal tax brackets, while leaving the maximum rate unchanged.10/ Third, changes in the distribution of asset holdings, as estimated by income flows, affect weights used to aggregate the separate tax rates of different income groups into an average rate. 11/

The average marginal tax rate on long-term capital gains for all taxpayers declined slightly between 1954 and 1965, then began rising to a peak of 22.7 percent in 1978 (Table 8 and Figure 4). It dropped sharply following the 1978 act and dropped again after the 1981 act to a low point of 13.9 percent in 1985.

---

10. The indexing of tax brackets in 1985 and 1986 kept taxpayers from being pushed into higher brackets by changes in the price level, although there could still be "bracket creep" resulting from real economic growth. No indexing is in effect for 1987 and 1988, as the 1986 act changes in rates, exemptions, and bracket widths are phased in.

11. Average marginal tax rates on capital gains are computed as weighted averages of last-dollar marginal tax rates on capital gains faced by taxpayers with the average amounts of capital gains and taxable income in each income group. The income groups used are those reported by the Internal Revenue Service in published volumes of the *Statistics of Income* between 1954 and 1985. The weights used to aggregate among income groups are predicted long-term capital gains, with gains predicted by an equation that includes as explanatory variables dividends and adjusted gross income less gains. The reason for using predicted instead of actual gains in the weighting is to remove any influence tax changes might have in altering the distribution of gains among income groups, thereby affecting the weights used in computing the average marginal rate. Using predicted instead of actual weights keeps the calculated average tax rate from being affected by the response of capital gains realizations to tax changes.

TABLE 8. ESTIMATED WEIGHTED AVERAGE MARGINAL TAX RATE ON CAPITAL GAINS, 1954-1985 (In percents)

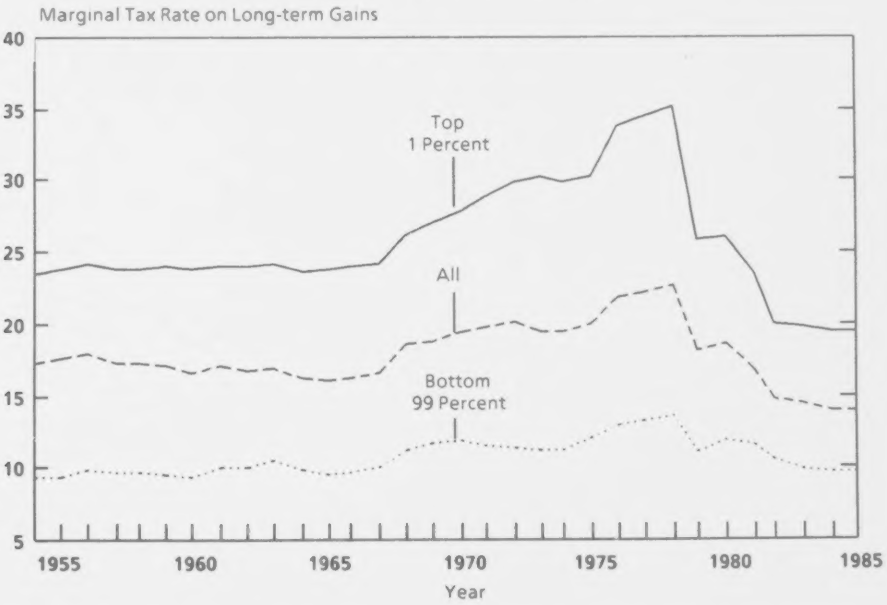
Year	All Returns	Top 1 Percent	Bottom 99 Percent
1954	17.3	23.6	9.1
1955	17.7	23.9	9.4
1956	18.0	24.3	9.8
1957	17.2	23.8	9.7
1958	17.3	23.8	9.8
1959	17.1	24.0	9.5
1960	16.7	23.9	9.8
1961	17.1	24.0	10.0
1962	16.8	24.0	10.1
1963	16.9	24.1	10.5
1964	16.2	23.7	9.9
1965	16.1	23.8	9.5
1966	16.2	24.0	9.6
1967	16.7	24.2	10.1
1968	18.6	26.2	11.3
1969	18.8	27.1	11.7
1970	19.5	27.9	11.9
1971	19.9	28.9	11.6
1972	20.1	30.0	11.5
1973	19.5	30.2	11.2
1974	19.5	29.9	11.2
1975	20.1	30.2	12.1
1976	21.9	33.8	12.8
1977	22.2	34.4	13.2
1978	22.7	35.1	13.7
1979	18.1	25.9	11.1
1980	18.6	26.1	11.9
1981	16.8	23.4	11.6
1982	14.8	20.0	10.6
1983	14.4	19.7	9.9
1984	14.0	19.4	9.7
1985	13.9	19.5	9.6
Projected 1988 Rates:			
Pre-1986 Law	14.4	19.7	10.4
Current Law	25.4	28.7	23.0

SOURCE: Congressional Budget Office, computed from published data of the Internal Revenue Service.

The movement of the average rate on gains reflects slightly different patterns of movement for the top 1 percent and bottom 99 percent of returns. The tax rate on the top 1 percent of returns fluctuated in a narrow band between 23.6 percent and 24.3 percent between 1954 and 1967. The rate then increased every year, with the exception of 1974, reaching a peak of 35.1 percent in 1978. It declined to 25.9 percent in 1979, increased slightly in 1980, and then dropped to 20.0 percent in 1982 and 19.4 percent in 1984.

For the bottom 99 percent, the rate increased gradually from 9.1 percent in 1954 to 10.5 percent in 1963 because of the movement of taxpayers into higher brackets induced by the growth in nominal income. It then dropped to 9.5 percent in 1965 as a result of the 1964 tax cut, but began rising again to 11.9 percent in 1970 as higher infla-

Figure 4.
Average Marginal Tax Rates on Long-Term Gains for Selected AGI Groups (Weighted by predicted gains)



SOURCE: Congressional Budget Office, computed from published data of the Internal Revenue Service.

tion pushed taxpayers into higher brackets. The rate dipped briefly in the mid-1970s, but then increased further to a peak of 13.7 percent in 1978, after which it declined with the 1978 capital gains cut and the phased-in 1981 marginal tax rate cut, reaching 9.6 percent in 1985, the lowest rate since 1966.

Under pre-1986 law, the average marginal rate on capital gains would have risen slightly to 19.7 percent for the top 1 percent and 10.4 percent for the bottom 99 percent in 1988. The 1986 act increases these rates in 1988 to 28.7 percent and 23 percent, respectively--an increase of 46 percent for the top 1 percent and 121 percent for the bottom 99 percent. The average marginal rate for the top 1 percent in 1988 is slightly above the rate that group paid after the 1978 tax cut and below the rate it paid for most of the 1970s. On the other hand, for the bottom 99 percent, the average marginal tax rate on capital gains realizations is substantially above any rate that group paid during the entire period.

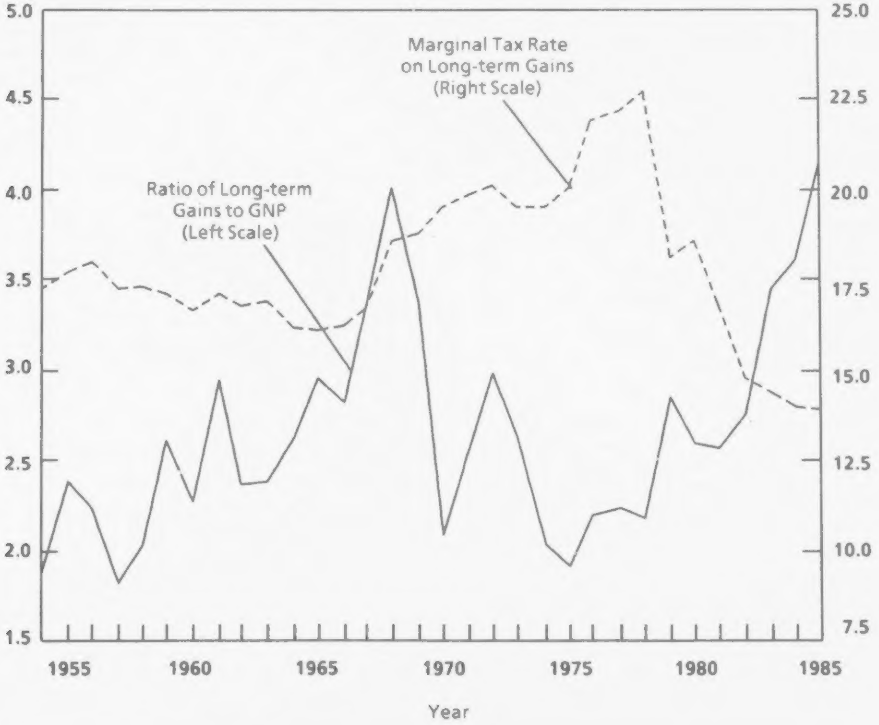
MARGINAL TAX RATES AND REALIZATIONS OF GAINS: A FIRST GLANCE

Over the 1954-1985 period, realized gains have generally increased more than GNP when marginal tax rates on gains were declining, and increased less than GNP when tax rates were rising and high. The gains-to-GNP ratio increased gradually between 1954 and 1967, as the marginal tax rate was declining slightly (see Figure 5). It rose sharply in 1968, a year the tax rate also increased. It then dropped sharply in 1970 and generally remained low until 1978, while tax rates were high and rising. After 1978, the gains-to-GNP ratio increased as the average marginal tax rate on gains declined. Thus, much of the divergence of realizations from GNP follows the fluctuations in tax rates. However, some of this fluctuation in realizations can also be explained by movements in corporate equity values, and other nontax variables. In Chapter IV, the determinants of these changes are estimated statistically.

REVENUE FROM CAPITAL GAINS TAXES

Revenue from taxes on long-term capital gains depends both on the level of realized long-term gains and on the rate at which those gains are taxed. As discussed above, realizations are influenced by the tax rate on gains, but also by other factors. The average tax rate is itself affected by the distribution of capital gains realizations: when the share of realizations of upper-income groups rises, the average tax rate on gains rises even if the tax law is unchanged.

Figure 5.
Marginal Tax Rates on Long-Term Gains and the Ratio of Long-Term Gains to Gross National Product (In percents)



SOURCES: Congressional Budget Office, computed from published data of the Internal Revenue Service and the Department of Commerce, Bureau of Economic Analysis.

Individual income tax assessments are based on taxable income, which is the sum of capital gains in adjusted gross income and other sources of taxable income, less deductions and exemptions. There is no separate tax schedule for capital gains. Individual tax liabilities attributable to long-term gains can, however, be computed by subtracting from total individual liabilities an estimate of taxes that would be payable if long-term gains were zero.12/ Such a calculation shows that revenue attributable to taxes on long-term gains has grown over time from less than $1 billion in 1954 to almost $24 billion in 1985, the last year for which detailed individual tax return data are available (see Table 9). Over this interval, tax revenues from gains have accounted for between 3.1 percent and 7.3 percent of total individual income tax liabilities.

The ratio of tax revenues from gains to total individual liabilities has fluctuated considerably over the 1954-1985 period. Revenues from gains increased rapidly in the 1950s and 1960s, peaking at 6.9 percent of individual liabilities in 1968. They declined to 3.6 percent of individual liabilities in 1970, rebounded to 5.8 percent in 1972, and fell again to 3.3 percent in 1974. Between 1976 and 1982, revenues from gains varied between 4 percent and 5 percent of total individual liabilities. As a percentage of total liabilities, they increased sharply along with the stock market boom of the 1980s to 6.1 percent in 1983 and a historical peak of 7.3 percent in 1985.

As a percentage of GNP, individual tax revenues from gains have ranged from 0.24 percent in 1957 to a peak of 0.59 percent in 1968 and again in 1985. Revenue from gains taxes as a percentage of GNP increased immediately following the 1978 capital gains tax cut, from 0.38 percent in 1978 to 0.42 percent in 1979, but fell back to 0.40 percent in 1980 and 0.37 percent in 1981 and 1982. After 1982, however, this ratio increased sharply, rising to 0.49 percent in 1983, 0.53 percent in 1984, and 0.59 percent in 1985.

---

12. This method of computing revenues attributable to capital gains is somewhat arbitrary because gains are "stacked last." In a progressive income tax, the assumption that gains are the "marginal" source of income means that the average tax rate on gains is equal to or greater than the average tax rate on other income for every taxpayer. If gains were stacked first in the computation--that is, if taxes were computed on gains income alone, with other income set to zero--then the revenue attributable to gains would be smaller.

TABLE 9. REVENUE ATTRIBUTABLE TO TAXES ON LONG-TERM CAPITAL GAINS, 1954-1985

Year	Revenue from Long-Term Gains (In billions of dollars)	Total Individual Tax Liabilities (In billions of dollars)	Gains Revenues as Share of:	
			Individual Liabilities (In percents)	GNP (In percents)
1954	0.9	26.7	3.5	0.25
1955	1.4	29.6	4.6	0.33
1956	1.3	32.7	4.0	0.31
1957	1.1	34.4	3.1	0.24
1958	1.2	34.3	3.6	0.27
1959	1.8	38.6	4.6	0.36
1960	1.6	39.5	4.1	0.31
1961	2.3	42.2	5.5	0.43
1962	1.9	44.9	4.2	0.33
1963	2.0	48.2	4.2	0.34
1964	2.4	47.2	5.0	0.37
1965	2.8	49.5	5.7	0.40
1966	2.8	56.1	4.9	0.36
1967	3.6	62.9	5.8	0.45
1968	5.3	76.6	6.9	0.59
1969	5.0	86.6	5.8	0.52
1970	3.0	83.8	3.6	0.30
1971	4.1	85.2	4.8	0.37
1972	5.4	93.4	5.8	0.45
1973	5.2	107.9	4.8	0.38
1974	4.1	123.5	3.3	0.28
1975	4.3	124.4	3.5	0.27
1976	6.3	140.8	4.5	0.36
1977	7.7	158.5	4.8	0.39
1978	8.5	186.7	4.5	0.38
1979	10.6	213.3	4.9	0.42
1980	11.0	249.1	4.4	0.40
1981	11.4	282.3	4.1	0.37
1982	11.8	276.1	4.3	0.37
1983	16.5	271.7	6.1	0.49
1984	20.1	301.9	6.7	0.53
1985	23.7	325.6	7.3	0.59

SOURCE: Congressional Budget Office, based on data on revenues from taxes on long-term and short-term gains supplied by U.S. Department of the Treasury, Office of Tax Analysis.

These data reveal no clear relationship between tax rates and tax revenues; revenue from taxes on gains as a share of GNP increased greatly in the 1960s when tax rates were stable; declined but then partly recovered in the 1970s when capital gains tax rates were increasing; and remained flat for a time, but then increased sharply in the late 1970s and early 1980s, when the tax rates were cut. In Chapter IV, the statistical estimates of the response of realizations to tax rates are used as an input to simulations of the revenue effects of changing the tax treatment of capital gains.

CHAPTER IV

STATISTICAL EVIDENCE ON CAPITAL GAINS AND TAX REVENUES

Changes in the realizations of capital gains over the 1954 through 1985 period can be explained by a simple equation in which realized gains are represented as depending on the level and rate of change of gross national product, the value of corporate equity held by individuals, and the marginal tax rate on capital gains. This chapter presents statistical estimates of several variants of such an equation and uses the results of those estimates to simulate the revenue effects of changes in tax rates on capital gains.

There are many alternative ways of specifying equations for capital gains realizations. The estimated behavioral response of realizations to tax policy changes is sensitive to how the equation explaining realizations is specified. A more detailed discussion of theoretical considerations in specifying these equations, along with estimates of some alternative specifications, are provided in Appendix A. Appendix A also contains a discussion of how data considerations limit the extent to which all possible hypotheses can be tested. Appendix B discusses in more general terms some of the limitations and qualifications that apply to all of the econometric work on realizations of capital gains, including this study.

DETERMINANTS OF CAPITAL GAINS REALIZATIONS

Taxpayers may wish to sell assets and realize gains either to rearrange their financial portfolios or to finance additional consumption or investment in housing and consumer durables. The motives for rearranging their portfolios may be either a belief that the future prospects of other assets are better than indicated by market prices, or a desire to reduce overall risk by selling assets that have recently accrued large capital gains.[1] In either event, the total amount of gains realized for portfolio purposes is likely to vary positively with the available stock of accrued gains and negatively with the transactions cost of realizing gains.

Taxpayers may also realize gains to finance real investment or consumption, as in purchases of houses and automobiles. Older taxpayers, in particular, may sell off part of the gains accumulated on savings during their working years to finance consumption in retirement. For these reasons, the level of realized gains may be expected to vary positively with the total level of economic activity, as measured by GNP.

Accrued Gains

The principal determinant of the level of realizations by individual taxpayers as reported on tax returns is the stock of accrued gains on assets that are subject to the capital gains tax. Gains subject to tax upon realization include those accrued in the current year and previous years on corporate equities, bonds, ownership of shares in proprietorships and partnerships, land, and on gold, art, and other collectibles. They do not include gains on assets held indirectly on behalf of individuals by pension funds and life insurance companies, because income of these entities is not subject to tax. They also largely exclude accrued gains on owner-occupied housing because most realized gains on owner-occupied housing are not taxed.[2] Accrued gains cannot be observed directly because data are not available on the basis of assets in the economy (see Box 1). In the equations reported in this chapter, a measure of household wealth is used as a proxy for accrued gains. The measure of wealth is the end-of-year total value of corporate equities held by individuals, published by the Board of Governors of

---

[1] For evidence that average rates of returns on realized stock market gains are much higher than the average growth of the market as a whole, see Office of the Secretary of the Treasury, *Report to Congress on the Capital Gains Tax Reductions of 1978* (September 1985), pp. 69-75.

[2] Capital gains on owner-occupied housing are largely untaxed for three reasons: gains can normally be rolled over if a more expensive home is purchased; since 1978, $125,000 of gains are excused on one sale for a taxpayer aged 55 or over; and there is a step-up in basis on homes (as well as other assets) transferred at death.

BOX 1
ESTIMATING ACCRUED GAINS

When someone sells an asset, the capital gain (or loss) is equal to the difference between the total sales value of the asset and its cost or "basis." The basis of the asset is its initial purchase price plus selling costs plus, in the case of real property, the cost of improvements.

Published data are available on the total market value of certain types of assets held by households, such as corporate equities. There are no comparable data on what the owners paid for their assets. Therefore, the amount of accrued gains, which is the difference between asset value and basis, cannot be observed directly.

The estimation of accrued gains is difficult, for several reasons. A number of influences can change the ratio of basis to value for assets in the economy, thereby changing the ratio of wealth to accrued gains. For example, if in 1960 taxpayer A sold $1,000 worth of shares in company I to taxpayer B and used the proceeds to purchase $1,000 worth of shares in company II from taxpayer B, this transaction itself would not change the total wealth held by the two taxpayers. It would, however, increase their basis in 1961 if the assets had originally been purchased for less than $1,000, and reduce their basis in 1961 if the assets had been purchased for more than $1,000. Put another way, the realization of a capital gain, followed by a subsequent repurchase, increases the ratio of basis to wealth and reduces the ratio of accrued gains to wealth. The realization of a capital loss has the opposite effect.

Several factors could contribute to changes in the ratio of accrued gains to wealth. Appreciation in the value of existing assets raises the ratio of accrued gains to wealth. When taxpayers realize more capital gains, the ratio of accrued gains to wealth declines. Similarly, when a taxpayer dies and passes on an asset with accrued gains to a beneficiary, the basis of the asset is "stepped up" from its original purchase price to its market value at the time it is inherited. This also reduces the ratio of accrued gains to wealth.

Finally, under the federal income tax, it has often been possible to depreciate assets for tax purposes more rapidly than their actual decline in market value. Depreciation deductions reduce the basis of assets in the same way that the realization of gains increases the basis. Thus, when tax depreciation is accelerated, the ratio of basis to wealth declines and the ratio of accrued gains to wealth increases.

the Federal Reserve System.[3] Corporate equities are a significant fraction of assets that give rise to capital gains, and also generally can be sold at lower transactions cost than other capital gains assets. No measure of wealth, however, includes the effect that changes in the basis may have on realizations of gains (see Box 1).

Equations were also estimated in which accrued gains were represented by a linear combination of all the variables that are believed to influence either wealth or basis, and in which a comprehensive accrued gains variable was created by making assumptions about the missing data. These equations are reported in Appendix A.

Total Economic Activity

GNP was used in the equations as a measure of total economic activity. Alternative measures, such as national income or personal income, would yield much the same results in the equations.

The use of GNP as an explanatory variable captures two possible effects on capital gains realizations. First, GNP is the most comprehensive measure of total spending, and in part captures the motive to sell capital gains assets either for consumption or for investment in housing and consumer durables. Second, as a measure of total economic activity, GNP may capture some of the influences on total wealth not included in the stock market variable. When combined with stock values, GNP performs better in explaining capital gains than a measure of household wealth in noncorporate equity.[4]

---

[3] See Board of Governors of the Federal Reserve System, *Balance Sheets for the U.S. Economy* (May 1987).

[4] The estimated value of noncorporate equity held by households, including farms and rental real estate, is also published by the Board of Governors of the Federal Reserve System. For noncorporate equity, however, the Federal Reserve Board data are based on an estimate of the replacement value of capital, not on actual market prices. For corporations, where both figures are available, the ratio of market value to the estimated replacement cost of capital has fluctuated considerably over time. Therefore, the estimated value of noncorporate equity is not a very good proxy for accrued gains.

Marginal Tax Rates

The main concern of this study is the extent to which permanent changes in marginal tax rates on long-term gains affect realizations of capital gains, for any given level of capital gains accruals. In a growing economy, the long-run ratio of realizations to accruals can increase either if the average holding period of assets is shortened (that is, if assets are sold more frequently) or if taxpayers realize a larger fraction of the gains accrued during their total lifetimes instead of passing them on tax-free to their beneficiaries.

Higher marginal tax rates on realized gains can both lengthen average holding periods and reduce the percentage of accrued gains realized during a taxpayer's lifetime. In particular, for taxpayers rearranging their portfolios, the overall benefits in terms of higher future expected returns or lower risk must be high enough to offset transactions costs, including capital gains taxes. The possibility that more asset sales will be desirable rises if the capital gains tax is lowered, leading to a more rapid turnover of portfolios.

It can be shown mathematically that even a substantial reduction in turnover (or a substantial increase in the average holding period) will have a relatively small negative impact on the long-run ratio of realizations to accruals, although it has a considerable first-year effect and also lowers the present value of realizations. This smaller long-run impact occurs because an immediate delay of realizations avoids an increase in the tax basis of assets, thereby raising potential future realizations. In a growing economy, the net effect is that a lengthening of the holding period permanently lowers the ratio of realizations to accruals by a modest amount.5/ In the absence of growth, less frequent turnover would have no effect on the ratio of realizations to accruals in the long run because smaller realizations in any one year would be exactly offset by larger realizations in the future.

A much larger permanent tax effect can be attributed to the step-up in basis at death. A high tax rate on gains realized during a tax-

---

5. Martin J. Bailey, "Capital Gains and Income Taxation," in Arnold C. Harberger and M.J. Bailey, eds., *The Taxation of Income from Capital* (Washington, D.C.: Brookings Institution, 1969), pp. 11-49.

payer's lifetime provides a large incentive to avoid consumption out of assets with accumulated gains and to hold onto those assets to leave as bequests. Because a large fraction of capital gains is realized by taxpayers in the very highest income groups--those who can be expected to leave the largest bequests--a big differential between the rate on gains realized during a taxpayer's lifetime and the rate on gains passed on at death (currently zero) can have a significant, negative effect on the permanent level of realizations.6/

The equations in this chapter use the current marginal tax rate on long-term gains as the only tax variable explaining realizations. If the short-run and long-run effects of tax rate changes on realizations were in fact the same, the coefficient on tax rates estimated from these equations could be properly interpreted as a measure of both the long-run and short-run effects of changes in tax rates. If the long-run and short-run effects differ, however, use of the current tax rate alone gives biased estimates of both. If the long-run effect is smaller than the short-run effect, the coefficient on the current tax rate understates the absolute size of the short-run effect but overstates the size of the long-run effect. On the other hand, if the long-run effect is larger than the short-run effect because, for example, taxpayers are slow to respond to changes in incentives, then the coefficient on the current tax rate overstates the absolute size of the short-run effect but understates the size of the long-run effect.7/

The data do not permit estimation of a complex set of lagged relationships between tax rates and realized gains. Experimentation with a one-period lag on the tax rate variable, shown in Appendix A, produced inconclusive results. In one specification, the long-run effect was estimated to be larger than the short-run effect, and in another specification the reverse was found. In neither case was the coefficient on the lagged tax rate term statistically significant.

---

6. The differential treatment of gains realized during a taxpayer's lifetime and gains left as bequests can be reduced either by lowering the tax rate on capital gains realizations or by eliminating the step-up in basis at death. Elimination of step-up can be accomplished either by requiring beneficiaries to inherit the tax basis of the assets of decedents (carryover basis) or by treating death as a "realization event" and taxing gains not realized during a taxpayer's lifetime. A provision for carryover basis, with a very long transition, was enacted in the 1976 act, but repealed in 1980.

7. For a fuller discussion of the bias in eliminating lag terms, see Appendix A.

STATISTICAL ESTIMATES

This section presents the major statistical results of this study. It describes the equations that estimate how much capital gains realizations are affected by changes in marginal tax rates on capital gains. The section that follows presents results of simulations of revenue from capital gains taxation that use the estimated responses of how realizations of capital gains respond to changes in marginal tax rates. The following section also discusses how statistical uncertainty in the estimates of the response of realizations causes uncertainty about the size and direction of revenue effects. An evaluation of the results in nontechnical terms is presented in the final section of this chapter.

Equations for the Entire Population of Taxpayers

Table 10 presents the results of four equations explaining the growth in long-term capital gains realizations between 1954 and 1985 for the entire taxpaying population. In all four equations, the dependent variable is the logarithm of either nominal or real long-term capital gains reported on all individual income tax returns. The independent variables are the price level, GNP, the change in GNP, the value of corporate equities held by individuals, and the marginal tax rate on capital gains. GNP, the change in GNP, and the value of corporate equities are measured in constant dollars. Except for the marginal tax rate, the independent variables are in logarithmic form. The logarithmic form is chosen to represent the approximately exponential growth rate in all the variables. The semi-log relationship between realizations and tax rates means that each percentage-point change in the tax rate results in the same percentage change in realized gains. Thus, for example, an increase in the tax rate from 0 to 1 percent would cause the same percentage reduction in realizations as an increase from 29 percent to 30 percent.[8]

---

[8] If the tax rate were also entered in log form, then each percent increase in the tax rate would result in the same percent reduction in capital gains. Under that functional form, an increase in the marginal tax rate from 1 percent to 1.5 percent would result in the same percent decline in realizations as an increase from 30 percent to 45 percent.

(Continued)

TABLE 10. REGRESSION EQUATIONS EXPLAINING CAPITAL GAINS REALIZATIONS FOR ALL TAXPAYERS, 1954-1985

(1)

$$\log(\mathrm{LTG}) = \underset{(3.63)^{a}}{-7.874} + \underset{(4.96)^{a}}{1.103}{\ast}\log(\mathrm{PRICE}) + \underset{(4.11)^{a}}{0.537}{\ast}\log(\mathrm{RCOEQ})$$

$$+ \underset{(3.09)^{a}}{1.128}{\ast}\log(\mathrm{RGNP}) - \underset{(2.33)^{b}}{0.032}{\ast}\mathrm{MTR}$$

$R^2 = .985$ S.E.E. = .113 D.W. = 1.559 $T^{\ast} = 31.3\%$

(2)

$$\log(\mathrm{LTG}) = \underset{(3.38)^{a}}{-6.822} + \underset{(5.75)^{a}}{1.173}{\ast}\log(\mathrm{PRICE}) + \underset{(4.19)^{a}}{0.501}{\ast}\log(\mathrm{RCOEQ})$$

$$+ \underset{(3.05)^{a}}{1.022}{\ast}\log(\mathrm{RGNP}) + \underset{(2.57)^{b}}{2.067}{\ast}\mathrm{dlog}(\mathrm{RGNP}) - \underset{(2.47)^{b}}{0.031}{\ast}\mathrm{MTR}$$

$R^2 = .989$ S.E.E. = .102 D.W. = 1.404 $T^{\ast} = 32.3\%$

(3)

$$\log(\mathrm{RLTG}) = \underset{(11.5)^{a}}{-8.810} + \underset{(6.09)^{a}}{0.489}{\ast}\log(\mathrm{RCOEQ}) + \underset{(18.5)^{a}}{1.293}{\ast}\log(\mathrm{RGNP})$$

$$- \underset{(3.95)^{a}}{0.037}{\ast}\mathrm{MTR}$$

$R^2 = .940$ S.E.E. = .111 D.W. = 1.550 $T^{\ast} = 27.0\%$

(4)

$$\log(\mathrm{RLTG}) = \underset{(11.7)^{a}}{-8.420} + \underset{(5.42)^{a}}{0.424}{\ast}\log(\mathrm{RCOEQ}) + \underset{(20.2)^{a}}{1.301}{\ast}\log(\mathrm{RGNP})$$

$$+ \underset{(2.494)^{b}}{1.975}{\ast}\mathrm{dlog}(\mathrm{RGNP}) - \underset{(4.517)^{a}}{0.039}{\ast}\mathrm{MTR}$$

$R^2 = .951$ S.E.E. = .102 D.W. = 1.417 $T^{\ast} = 25.6\%$

SOURCE: Congressional Budget Office.

NOTES: t-statistics are in parentheses.
a = significantly different from zero at 1% level.
b = significantly different from zero at 5% level.
T* = revenue-maximizing tax rate.

Variable Definitions:

log(LTG) = logarithm of net long-term gains, in excess of net short-term losses;
log(PRICE) = logarithm of the GNP deflator;
log(RCOEQ) = logarithm of the value of corporate equities held by households (in constant dollars);
log(RGNP) = logarithm of GNP (in constant dollars);
dlog(RGNP) = change in the logarithm of GNP (in constant dollars);
MTR = weighted average marginal tax rate on capital gains; and
log(RLTG) = logarithm of net long-term gains, in excess of net short-term losses (in constant dollars).

In Equation 1, capital gains in current dollars are represented as depending on stock market values and GNP (in constant dollars), the price level, and the marginal tax rate on capital gains. Realizations increase with increases in the overall price level, GNP, and the value of corporate equities held by individuals, and decrease with increases in the marginal tax rate on gains. Movements in these four variables explain 98.5 percent of the year-to-year changes in realized gains over the 1954-1985 period (see the R^2 statistic in Table 10). There remains, however, a considerable unexplained component of capital gains; the standard error of estimate (S.E.E.) implies that about 30 percent of the time gains will be at least 11 percent above or below the amount predicted by the equation. The coefficient on the tax rate term MTR implies that a one-percentage-point increase in the average marginal tax rate on capital gains will reduce realized long-term gains by 3.2 percent. For a flat-rate tax system, it implies that the revenue-maximizing tax rate T^* on capital gains would be slightly over 31 percent (1/.032, as shown in Table 10).

Examination of the residuals of Equation 1 shows that it underpredicts gains in years of strong economic growth and overpredicts gains in recession years. In recent years, the equation overpredicts gains in 1980 through 1982 and underpredicts gains in 1983 through 1985 (see Table 11). This result suggests inclusion of a cyclical variable in the equation. Equation 2 is similar to 1 except that the change in the logarithm of real GNP (the percentage growth in real GNP) is added as an explanatory variable. Adding the growth rate of GNP to the equation reduces the standard error, increases the explanatory power of the equation, and produces a much better fit of the equation to data from recent years. The tax rate coefficient re-

---

8. Continued

The semi-log form is chosen instead of the log form because the same percentage increases in the tax rate will probably have a much bigger impact on gains if the tax rate is large to begin with. The semi-log form implies that the elasticity of realizations with respect to the tax rate increases in absolute value as the tax rate is increased. This means that, starting from a zero tax rate, increases in marginal tax rates at first raise revenues but then could ultimately lower revenues if the absolute value of the elasticity grew to become greater than one. For a flat-rate tax on gains, the revenue-maximizing tax rate is $-1/A$, where A is the percentage reduction in gains per unit percentage-point increase in the marginal tax rate.

An alternative functional form in which the tax rate measure used is the logarithm of the gain per dollar of pretax gain (1 minus the marginal tax rate) also has the property of yielding an elasticity that increases in absolute value as the tax rate increases. Equations using this form, a quadratic form, and a logarithmic form are reported in Appendix A. The results are qualitatively similar to those reported in Table 10.

mains virtually unchanged (-0.031 instead of -0.032, which implies a revenue-maximizing rate of 32 percent instead of 31 percent).

Equations 3 and 4 use the logarithm of gains in constant dollars instead of gains in current dollars as the dependent variable and eliminate the price level term as an independent variable. This change is equivalent to constraining the coefficient on the price term in Equations 1 and 2 to be equal to 1.0; that is, a 1 percent increase in the price level raises gains, measured in current dollars, by 1 percent and has no effect on gains measured in constant dollars. Because the estimated coefficient on the price term in Equations 1 and 2 is very close to 1.0, one cannot reject the hypothesis that gains in constant dollars are unaffected by the price level.

The estimates of the responsiveness of realized gains to taxes are somewhat higher in Equations 3 and 4 than in Equations 1 and 2. For example, Equation 4 implies that a one-percentage-point increase in the marginal tax rate on capital gains will lower realizations of long-term gains by 3.9 percent. This estimate is consistent with a revenue-maximizing flat rate of slightly under 26 percent. The other coefficients of Equations 3 and 4 are similar to those of Equations 1 and 2; again, including the change in the logarithm of GNP in the

TABLE 11. ACTUAL MINUS FITTED GAINS IN RECENT YEARS IN EQUATIONS FOR ALL TAXPAYERS (In percents)

Equation	1980	1981	1982	1983	1984	1985
(1)	-6.2	-9.0	-11.0	+4.5	+6.8	+8.8
(2)	-2.0	-7.6	-1.6	+1.4	-1.1	+7.3
(3)	-6.0	-7.6	-10.0	+5.0	+7.0	+8.2
(4)	-0.3	-7.0	-0.7	+3.0	-0.1	+8.9

SOURCE: Congressional Budget Office.

equation improves its predictive power and does a better job of fitting the data for the early 1980s. The statistical evidence does not favor either the higher tax responsiveness of Equations 3 and 4 or the lower tax responsiveness of Equations 1 and 2.9/

Separate Equations for the Top Income Group and All Other Groups

Tables 12 and 13 report results for separate estimates of Equations 1 through 4 for the top 1 percent and bottom 99 percent of tax returns, ranked by AGI. For the top 1 percent, the estimated reduction in realizations for a one-percentage-point increase in marginal tax rates ranges between 2.9 percent and 3.2 percent, about the same as the estimated response for the entire sample in Equations 1 and 2. The coefficient on marginal tax rates is statistically significant at the 1 percent level in all four equations. The implied revenue-maximizing flat-rate tax of between 31 percent and 34 percent is within the sample range of tax rates for the top 1 percent.

For the bottom 99 percent, the estimates are much less precise. In all four equations, the tax rate effect is negative, but it is not significantly different from either zero or the estimated effect for the top 1 percent.10/

---

9. The tax response is slightly higher in Equations 3 and 4 because the price level is estimated to have a positive, though small, effect on constant-dollar gains (the coefficient of the price level in Equations 1 and 2 is slightly above 1.0). The tax rate is negatively correlated with the price level and therefore picks up some of the price effect in Equations 3 and 4 when the price level is omitted.

The higher responsiveness found in Equations 3 and 4 would be preferred if random fluctuations accounted for the price coefficients being above 1.0. (In this case, the price level truly has no effect on gains (in constant dollars) and its absence from Equations 3 and 4 represents the correct specification). On the other hand, the lower responsiveness of Equations 1 and 2 would be preferred if inflation actually has a small positive effect on gains. (In this case, the tax rate coefficients in Equations 3 and 4 are biased away from zero by the omission of the price level.) Statistical tests do not show one possibility to be much more likely than the other.

The estimated Durbin-Watson (D.W.) statistics in Table 10 fail either to confirm or to reject the hypothesis of no autocorrelation of residuals. Using the Cochrane-Orcott procedure for correction for autocorrelation does not significantly alter the estimated coefficients of the equations. Equations with an autoregressive term are displayed in Appendix A.

10. One reason for the failure to identify a significant tax effect for the bottom 99 percent may be that their marginal tax rates have varied only slightly during the sample period, while the variance in rates for the top 1 percent has been much larger. The fact that absolute changes in marginal tax rates on gains have been much larger for the top 1 percent than for the bottom 99 percent also explains why the share of gains realized by the top 1 percent has declined when average marginal tax rates on gains have fallen (see Table 2).

TABLE 12. REGRESSION EQUATIONS EXPLAINING CAPITAL GAINS REALIZATIONS FOR THE TOP 1 PERCENT OF RETURNS, 1954-1985

(1.01)
$$\log(LTG01) = \underset{(4.93)^{a}}{-10.900} + \underset{(3.13)^{a}}{0.901}{*}\log(PRICE) + \underset{(7.30)^{a}}{0.848}{*}\log(RCE01) + \underset{(4.08)^{a}}{1.839}{*}\log(RY01) - \underset{(5.81)^{a}}{0.032}{*}MTR01$$

$R^2 = .984$ S.E.E. $= .118$ D.W. $= 1.796$ $T^* = 31.3\%$

(2.01)
$$\log(LTG01) = \underset{(3.27)^{a}}{-7.620} + \underset{(4.34)^{a}}{1.272}{*}\log(PRICE) + \underset{(8.47)^{a}}{0.899}{*}\log(RCE01) + \underset{(2.48)^{b}}{1.175}{*}\log(RY01) + \underset{(2.71)^{b}}{1.423}{*}d\log(RY01) - \underset{(5.78)^{a}}{0.029}{*}MTR01$$

$R^2 = .987$ S.E.E. $= .106$ D.W. $= 2.243$ $T^* = 34.5\%$

(3.01)
$$\log(RLTG01) = \underset{(11.2)^{a}}{-10.214} + \underset{(9.73)^{a}}{0.872}{*}\log(RCE01) + \underset{(19.8)^{a}}{1.688}{*}\log(RY01) \underset{(6.08)^{a}}{-0.032}{*}MTR01$$

$R^2 = .943$ S.E.E. $= .116$ D.W. $= 1.81$ $T^* = 31.3\%$

(4.01)
$$\log(RLTG01) = \underset{(11.1)^{a}}{-9.623} + \underset{(10.1)^{a}}{0.838}{*}\log(RCE01) + \underset{(19.2)^{a}}{1.607}{*}\log(RY01) + \underset{(2.58)^{b}}{1.196}{*}d\log(RY01) - \underset{(6.54)^{a}}{0.031}{*}MTR01$$

$R^2 = .954$ S.E.E. $= .106$ D.W. $= 2.169$ $T^* = 32.3\%$

SOURCE: Congressional Budget Office.

NOTES: t-statistics are in parentheses.
a = significantly different from zero at 1% level.
b = significantly different from zero at 5% level.
T* = revenue-maximizing tax rate.

Variable Definitions:

log(LTG01) = logarithm of net long-term gains, in excess of net short-term losses, received by top 1 percent of returns ranked by AGI;
log(RCE01) = logarithm of corporate equities (in constant dollars) held by individuals multiplied by share of dividends received by top 1 percent of returns;
log(RY01) = logarithm of GNP (in constant dollars) multiplied by share of AGI other than capital gains received by top 1 percent;
dlog(RY01) = change from the preceding year in log(RY01);
MTR01 = average marginal tax rate on long-term capital gains for top 1 percent of returns;
PRICE = GNP deflator; and
log(RLTG01) = logarithm of net long-term gains, in excess of net short-term losses, received by top 1 percent of returns (in constant dollars).

TABLE 13. REGRESSION EQUATIONS EXPLAINING CAPITAL GAINS REALIZATIONS FOR THE BOTTOM 99 PERCENT OF RETURNS, 1954-1985

(1.99)
$$\log(LTG99) = \underset{(6.19)^{a}}{-11.709} + \underset{(4.72)^{a}}{0.725}*\log(PRICE) + \underset{(2.86)^{a}}{0.260}*\log(RCE99)$$
$$+ \underset{(5.72)^{a}}{1.774}*\log(RY99) - \underset{(1.47)}{0.032}*MTR99$$

$R^2 = .990$ S.E.E. = .094 D.W. = 1.483 T* = 31.3%

(2.99)
$$\log(LTG99) = \underset{(6.35)^{a}}{-10.825} + \underset{(5.76)^{a}}{0.796}*\log(PRICE) + \underset{(2.81)^{a}}{0.229}*\log(RCE99)$$
$$+ \underset{(6.06)^{a}}{1.677}*\log(RY99) + \underset{(2.90)^{a}}{1.868}*d\log(RY99) - \underset{(1.40)}{0.028}*MTR99$$

$R^2 = .992$ S.E.E. = .084 D.W. = 1.461 T* = 35.7%

(3.99)
$$\log(RLTG99) = \underset{(16.8)^{a}}{-8.435} + \underset{(5.67)^{a}}{0.376}*\log(RCE99) + \underset{(14.4)^{a}}{1.239}*\log(RY99)$$
$$\underset{(0.444)}{-0.008}*MTR99$$

$R^2 = .954$ S.E.E. = .098 D.W. = 1.409 T* = 125.0%

(4.99)
$$\log(RLTG99) = \underset{(19.1)^{a}}{-8.378} + \underset{(5.04)^{a}}{0.310}*\log(RCE99) + \underset{(16.8)^{a}}{1.283}*\log(RY99)$$
$$+ \underset{(3.14)^{a}}{2.036}*d\log(RY99) - \underset{(0.59)}{0.009}*MTR99$$

$R^2 = .967$ S.E.E. = .085 D.W. = 1.342 T* = 111.1%

SOURCE: Congressional Budget Office.

NOTES: t-statistics are in parentheses.
a = significantly different from zero at 1% level.
b = significantly different from zero at 5% level.
T* = revenue-maximizing tax rate.

Variable Definitions:

log(LTG99) = logarithm of net long-term gains, in excess of net short-term losses, received by bottom 99 percent of returns ranked by AGI;
log(RCE99) = logarithm of corporate equities (in constant dollars) held by individuals multiplied by share of dividends received by bottom 99 percent of returns;
log(RY99) = logarithm of GNP (in constant dollars) multiplied by share of AGI other than capital gains received by bottom 99 percent;
dlog(RY99) = change from preceding year in log(RY99).
MTR99 = average marginal tax rate on long-term capital gains for bottom 99 percent of returns;
PRICE = GNP deflator; and
log(RLTG99) = logarithm of net long-term gains, in excess of net short-term losses, received by bottom 99 percent of returns (in constant dollars).

The point estimates of the tax coefficient in Equations 1 and 2 are -0.032 and -0.028, almost the same as the point estimates for the top 1 percent in the same equations. The point estimates fall almost to zero in Equations 3 and 4, however. These levels are well below the tax coefficients for the top 1 percent in those equations. The large drop in the tax response in Equations 3 and 4 arises in part because the coefficients of the price level in Equations 1 and 2 are significantly below zero.[11] Those coefficients mean that inflation is estimated to lower gains (in constant dollars) significantly for the bottom 99 percent of taxpayers. Thus, Equations 3 and 4, which assume that inflation has no effect on constant-dollar gains, appear to be misspecified and their estimates of tax effects biased. Equations 1 and 2, with their higher tax responsiveness, are the preferred estimates for the bottom 99 percent of returns.

Even though the tax variable is less important for low-income groups, the equations fit better for the bottom 99 percent than for the top 1 percent. In particular, realizations for the bottom group are less volatile and their movements track more closely the movements in the economy than do changes in realizations for the top group. In addition, realizations in the bottom 99 percent of returns are much less affected by movements in stock market values than are realizations for the top 1 percent.

The data used for estimating regressions for the separate groups are less reliable than those used for estimating the entire sample, because the data for separate groups are not exact. The division of gains between the two groups must be interpolated because published data classify income groups by nominal dollars instead of percentiles. The division of wealth holdings among income groups is not known and must be imputed from published data on income flows. In addition, a bias is introduced when splitting the data because the measure used to classify the top 1 percent of returns, AGI, itself depends on the realizations of gains. As realizations increase, taxpayers will be moved into the top 1 percent of returns because of capital gains so that the composition of the top 1 percent will change. The result is that capital gains in the top group may be overstated in years when total gains are high, and understated in years when total gains are low, compared with the increase in gains in the top group that would be observed if the composition of the top group were not affected by induced realizations. A correction for this bias suggests it has only a slight effect on the estimates. 12/

---

[11] A second reason the tax coefficient changes more for the bottom 99 percent is that their tax rate is more strongly related to the price level than is the tax rate for the top 1 percent (or that for all taxpayers). Tax rates for the top 1 percent are so weakly related to the price level that the tax coefficients are largely unaffected even though the price coefficient is significantly above 1.0 in Equation 2. For all three groups the tax rate is negatively related to the price level, holding fixed equity and GNP (in constant dollars). For the top 1 percent, the relationship is smaller and not statistically significant.

RELIABILITY OF THE ESTIMATES AND THEIR IMPLICATIONS FOR REVENUE EFFECTS

While the point estimates shown in Table 10 are all fairly close together, it is possible to derive varying estimates by changing the specification of the realizations equation. A wider range of alternative specifications is displayed in Appendix A.

The estimates in Table 10 are not precise in themselves; the standard error of the tax coefficient is big enough so that a wide range of possible responses cannot be rejected. For example, a 95 percent confidence interval (which includes values within roughly two standard errors of the estimate) for the tax coefficient in Equation 1 includes values as small as -0.005 and as large as -0.059 (see Table 14). The lower-bound response implies that any feasible tax rate increase would raise revenue; the upper-bound response, on the other hand, implies that revenue is maximized at about a 17 percent tax rate. A 95 percent confidence interval around the coefficients of Equations 3 and 4 shows a lesser, but still considerable, range, with the implied revenue-maximizing rates ranging from 18 percent to around 50 percent.

The entire relationship between tax rates and revenue, not only the revenue-maximizing point, is highly sensitive to the estimate of the realizations response. Table 15 and Figure 6 show the relationship between revenue from capital gains taxes and the tax rate on

---

12. The correction in the data is based on more complete information available for 7 of the 31 years in the sample, and imputed for the other years. Substitution of the corrected data in Equation 1 in Tables 12 and 13 reduces the estimate of the tax response from -0.0323 to -0.0316 for the top 1 percent and increases the estimated response from -0.0329 to -0.0348 for the bottom 99 percent. The method used to correct the data is described in Appendix A.

capital gains (again assuming a flat-rate tax) for the midpoint and extreme values of the 95 percent confidence interval around the realizations response estimated in Equation 1. The table and figure are calibrated to set revenue equal to 100.00 for a tax rate of 20 percent (the maximum rate under pre-1986 law); the other numbers in the table show revenue relative to revenue at a 20 percent rate.

For the most likely estimate of the realizations response in Equation 1 (the midpoint of the confidence interval), the revenue-maximizing rate is 31.3 percent, with revenue at that rate 9 percent higher than revenue at a 20 percent rate. The behavioral response

TABLE 14. CONFIDENCE INTERVALS FOR TAX EFFECT ON REALIZATIONS AND REVENUE-MAXIMIZING RATE FOR ENTIRE POPULATION OF TAXPAYERS

Equation	Point Estimate	95 Percent Confidence Interval on Realizations Response
	Percentage Change in Realizations per Unit Change in Marginal Tax Rates	
(1)	-0.032	-0.005 to -0.059
(2)	-0.031	-0.006 to -0.056
(3)	-0.037	-0.019 to -0.055
(4)	-0.039	-0.022 to -0.056
	Revenue-Maximizing Flat Rate (In percents)	
(1)	31.2	16.9 to 197.9
(2)	32.3	18.0 to 158.6
(3)	27.2	18.2 to 53.8
(4)	25.8	18.0 to 45.6

SOURCE: Congressional Budget Office

offsets much of the "static" gain from higher rates; with no behavioral response, revenue at 31.3 percent would be about 57 percent higher than revenue at 20 percent. The revenue changes are very small for changes in rates near the revenue-maximizing rate. For example, reducing the rate to 25 percent and increasing it to 40 percent both lower revenue by less than 5 percent.

For the upper-bound realizations response in the confidence interval, revenue peaks at a 16.9 percent rate, and revenue at a 15 percent rate is higher than at a 20 percent rate. Revenue falls off very sharply as rates decline to 10 percent and below. Thus, although the point

TABLE 15. IMPLIED SHAPE OF RELATIONSHIP BETWEEN TAX RATES AND REVENUE FROM CAPITAL GAINS TAXES

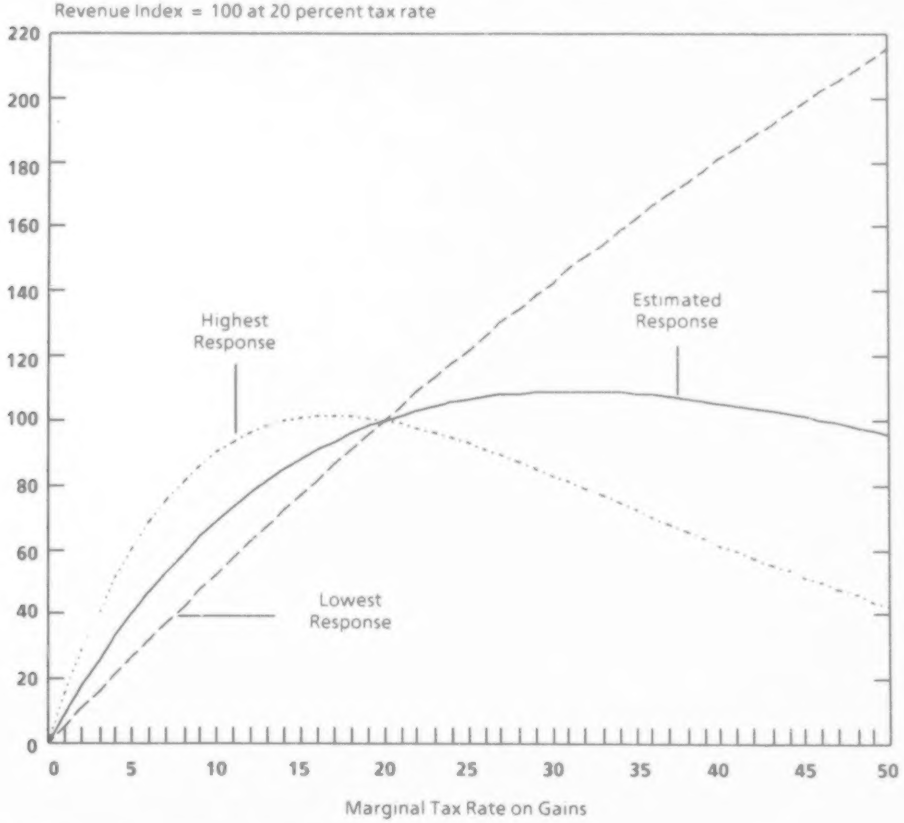
	Point on Confidence Interval of Realizations Response			
Marginal Tax Rate on Gains	Mid-point (-.032)	High Response (-.059)	Low Response (-.005)	Zero Response
0	0	0	0	0
5	40.4	60.6	26.9	25.0
10	68.9	90.2	52.6	50.0
15	88.0	100.7	76.9	75.0
16.9	93.3	101.5	85.8	84.5
20	100.0	100.0	100.0	100.0
25	106.5	93.1	121.9	125.0
30	108.9	83.1	142.7	150.0
31.3	109.0	80.3	147.9	156.6
35	108.3	72.2	162.4	175.0
40	105.5	61.5	181.0	200.0
45	101.1	51.5	198.6	225.0
50	95.7	42.6	215.2	250.0

SOURCE: Congressional Budget Office.

NOTE: This example assumes a flat-rate tax, using the realizations response estimated in Equation 1, showing midpoint and extreme values. Revenues are indexed at 100 for a tax rate of 20 percent.

estimate implies a considerable revenue loss from lowering the capital gains tax rate to 15 percent, the possibility of a revenue gain cannot be entirely rejected. On the other hand, for the lower-bound response, revenue rises almost as much with higher tax rates as it would if there were no behavioral response. For example, a doubling of the rate from

Figure 6.
Relationship of Revenue from Capital Gains Taxes to Marginal Tax Rates on Gains



SOURCE: Congressional Budget Office.

NOTE: The curves show how revenues change with marginal tax rates under three responses of realizations to marginal tax rates: the response estimated in Equation 1 of Table 10; and the highest and lowest responses within a 95 percent confidence interval around that estimated response.

20 percent to 40 percent raises revenue by 81 percent, compared with a 100 percent increase with no behavioral response.

Table 16 compares annual revenue from capital gains taxes under pre-1986 law at 1988 income levels with two alternatives: current law, and a proposal to amend current law by setting a maximum rate of 15 percent on long-term capital gains and removing long-term gains from the alternative minimum tax on tax preference income. Revenue from capital gains taxes is calculated by subtracting from total individual income tax liabilities an estimate of total taxes that would be payable if net long-term capital gains were zero. Revenue under pre-1986 law is estimated at the level of gains realizations that would have been projected under previous law. (This estimate differs from an estimate of actual 1988 realizations because the 1986 tax law induced people to accelerate their gains from 1987, 1988, and subsequent years to 1986 to avoid paying tax at the increased rates.) Revenue under alternative laws is estimated at simulated levels of realizations; the changes in realizations are computed by multiplying the changes in marginal tax rates on long-term gains (at the initial level of realizations) in the two alternative laws by the realizations response coefficients estimated in Equations 1 through 4. (These computations are described in Box 2.)

The hypothetical revenue effects of changes in tax law displayed in Table 16 differ from actual revenue estimates because they do not take into account timing effects of changing the tax law. In particular, the 1986 act accelerated realizations from future years into 1986 because the lower rates under pre-1986 law remained in effect between the date of enactment and January 1, 1987; these additional realizations resulted in higher tax collections in fiscal year 1987. Table 16 instead displays the consequences for annual revenue, apart from immediate timing response, of the change in the structure of tax rates on capital gains implied by the realizations response estimates in this paper.

The realizations responses estimated in all four equations show that the 1986 act increased revenue from capital gains taxes and that a lowering of the top rate on capital gains to 15 percent would reduce revenue from capital gains taxes. The estimated revenue increases from the 1986 act are, however, much lower than the increase that

TABLE 16. COMPARISON OF CAPITAL GAINS REVENUE UNDER PRE-1986 LAW WITH REVENUE UNDER CURRENT LAW AND UNDER A 15 PERCENT MAXIMUM RATE
(In billions of dollars)

Behavioral Response	Total Revenues a/	Change from Pre-1986 Law	Change from Current Law
	Pre-1986 Law		
	39.0	--	--
	Current Law		
No Realizations Response	61.4	+22.4	--
Equation 1 Response	44.5	+5.5	--
Equation 2 Response	44.9	+5.8	--
Equation 3 Response	42.4	+3.4	--
Equation 4 Response	41.6	+2.5	--
	Current Law, with 15 Percent Maximum Rate on Capital Gains		
No Realizations Response	35.3	-3.7	-26.1
Equation 1 Response	37.1	-1.9	-7.4
Equation 2 Response	37.1	-2.0	-7.8
Equation 3 Response	37.5	-1.5	-4.9
Equation 4 Response	37.7	-1.3	-3.9

SOURCE: Congressional Budget Office simulations using published data from the Internal Revenue Service.

NOTE: In estimating the 15 percent maximum rate, it was assumed that the restored capital gains preference would not be included in the base of the alternative minimum tax.

a. At 1988 levels, based on January 1987 CBO economic assumptions.

BOX 2
REVENUE SIMULATIONS

Tax payments by individual taxpayers are simulated using a sample of 80,000 tax returns for tax year 1984 produced by the Statistics of Income Division of the Internal Revenue Service. It is a stratified sample that over-represents high-income returns; the separate observations are weighted to add up to the entire taxpaying population. The data were extrapolated to 1988, with different types of income grown according to CBO economic assumptions. CBO has also developed a tax calculator that can be applied to the tax return data in the sample to compute tax liability; the tax calculator can be modified to reflect actual or proposed changes in the tax law.

All of the revenue computations are at levels of income projected in tax year 1988. In simulating the effects of changes in capital gains taxation, the first step is to compute marginal tax rates on the last dollar of long-term capital gains for all taxpayers at levels of realizations projected under pre-1986 law. Marginal tax rates are computed under pre-1986 law, current law (after tax reform), and with a maximum tax rate on long-term gains of 15 percent. Then, the estimates of the realizations response reported in Table 10, combined with the changes in marginal tax rates on gains for each taxpayer, are used to compute new levels of realizations for all taxpayers for current law and with a 15 percent maximum rate. The levels of realizations projected under pre-1986 law and those simulated for the two alternatives are then combined with other data on tax returns to compute taxable income and tax liability for each taxpayer under all three tax laws.

The simulation of the effects of changes in tax rates on realizations used the responses estimated in the equations for the entire sample in Table 10 instead of the separate responses for the top 1 percent and bottom 99 percent of returns shown in Tables 12 and 13. The reason for not using the separate responses is that the estimates for the bottom 99 percent have a high standard error and are therefore not too reliable statistically. Moreover, as noted in the text, the estimates fail to reject the hypothesis that the responses are the same for the bottom 99 percent and the top 1 percent. Even though a common response is used for all taxpayers in the simulations, the revenue effects still depend on the structure of the tax rate change because the elasticity of realizations is larger at higher tax rates. This means that an increase in the average marginal tax rate on gains among all taxpayers will have a smaller adverse effect on realizations if the percentage increase in marginal tax rates is relatively larger among low-bracket taxpayers. Revenue from capital gains taxes is maximized at a flat-rate tax on capital gains equal to the revenue-maximizing rate implied by the estimate of the realizations response.

would occur if there were no behavioral response. The no-behavioral response (or static) revenue gain is $22.4 billion; the net gain with behavioral response varies from $2.5 billion (Equation 4) to $5.8 billion (Equation 2). Thus, the realizations response is estimated to offset between 75 percent and 90 percent of the static revenue pickup from tax reform.

Since the enactment of the Tax Reform Act of 1986, there has been some discussion in the Congress of a proposal to reduce the maximum tax rate on long-term capital gains to 15 percent. Proponents of this proposal have claimed that it would increase revenue because the increase in realizations would offset the direct loss from lower rates.13/ The most likely realizations responses estimated in Equations 1-4, however, imply that a 15 percent maximum rate would reduce annual revenues from capital gains taxes by between $4 billion and $8 billion, compared with current law. Revenues would be lower than under pre-1986 law by between $1 billion and $2 billion. Still, as noted above, the range of uncertainty in the coefficient estimates is large enough that one cannot reject the possibility that a 15 percent rate might increase revenues.

EVALUATION OF FINDINGS

Four major themes emerge from the data presented in Tables 10 through 16. First, the statistical results confirm earlier research findings that higher marginal tax rates on capital gains lower realizations of capital gains. The results are consistent with the widely held view that any overall revenue pickup from raising capital gains taxes is considerably less than the static pickup. They also support the general practice of taking account of behavioral responses to capital gains taxes used in the official revenue estimates of the Joint Committee on Taxation and the U.S. Department of the Treasury. They also suggest that tax rates on capital gains cannot be raised too high without ultimately reducing revenue.

---

13. For a discussion of this proposal, and the views of supporters and opponents, see Lawrence J. Haas, "A 15 Percent Solution?" *National Journal* (November 7, 1987).

Second, as shown in this chapter, historical evidence suggests that, in spite of the behavioral response, the increase in capital gains tax rates in the 1986 act most likely will increase revenue from capital gains taxes, while a reduction of the top rate to 15 percent would most likely reduce revenue. The realizations response used in these estimates is qualitatively consistent with some earlier research, but is smaller than the response estimated in some of the studies that use cross-section data.

Third, the evidence of a significant realizations response is much greater for very-high-income taxpayers than for the remainder of the population, although statistical tests fail to confirm a clear difference between the top 1 percent and the bottom 99 percent. Changes in the share of gains realized by the top 1 percent of taxpayers in response to past tax rates on gains might be attributable to the fact that such taxpayers have experienced larger absolute changes in their marginal tax rates.

Fourth, it is important to emphasize that considerable uncertainty must be attached to the results of all statistical studies on the realizations of capital gains, including this one. The estimated effect of marginal tax rates on realizations is very sensitive to the selection of other variables included in the equation as determinants of capital gains. In addition, the standard errors around the estimated coefficients in all equations, while allowing one to reject the hypothesis that there is no realizations effect of higher rates, allow for a wide range of negative responses. Moreover, relatively modest percentage changes in the realizations response translate into much larger percentage changes in the net revenue effect of a tax change. As a result, standard statistical tests do not permit rejection of the possibility that the 1986 act reduced revenue from capital gains taxes or that a 15 percent rate would raise revenue. The latter possibility, however, is unlikely.

Finally, one important limitation of the analysis in this chapter needs to be emphasized. The statistical results show only the effect that changes in tax rates on capital gains would have on taxes collected from realized capital gains; they do not take into account all of the behavioral responses that could affect income tax revenues. Other components of the tax base, or even the size of the economy, would change as a result of changes in capital gains tax rates. As noted in Chapter II, these broader effects have not been quantified in any of the statistical studies of the revenue effects of capital gains taxation.

Aside from affecting realizations, changes in capital gains tax rates are most likely to alter the form in which income from capital is received, and its distribution among taxpayers. For example, a reduction in capital gains tax rates that encouraged realizations could also encourage corporations to increase retained earnings at the expense of lower dividend payouts and less debt financing. Both of these changes would lower individual income tax revenues because dividend and interest income is taxable, while unrealized appreciation is not. (Less debt financing would, however, raise corporate revenues.) For assets such as real estate, lower capital gains tax rates that increased the turnover of assets would also increase depreciation write-offs, thereby lowering taxable business income, because the depreciable basis of assets is increased when gains are realized. This effect also would tend to offset any positive revenue feedback from increased realizations.

On the other hand, a reduction in top rates on capital gains could cause some high-bracket investors to substitute direct holdings of corporate equity for investments held through pension funds and investments in owner-occupied housing and consumer durables. This substitution would increase revenue even if capital gains were tax-preferred, because these alternative investments produce no taxable income.

Lower capital gains taxes could raise future taxable income by increasing total saving and economic growth, if private saving responded positively to increases in after-tax rates of return. This effect would be clearest if the lower taxes on capital gains were financed by increasing consumption taxes, resulting in a net decrease in the taxation of saving. A shift from taxation of capital gains to taxation of interest and dividend income might only alter the form of saving and investment, but not the level. In any event, even if the response of saving to after-tax returns was positive, it would increase GNP and the total tax base only gradually over time. Even then, the overall effect on the tax base would probably be modest because capital gains taxes are only a small part of the overall taxation of capital income. For example, one simulation study, which assumed a significant response of saving to after-tax returns, placed the increase in income from the capital gains tax reduction in the 1978 act at much less than 1 percent after 50 years.14/

Finally, it is important to emphasize that many factors other than revenue effects deserve consideration in deciding how to tax capital gains. These considerations could be used to justify capital gains rates either below or above the estimated revenue-maximizing rate. Lower tax rates on gains could increase saving and capital formation and channel more resources into venture capital. In addition, a preferential rate on gains provides a rough adjustment for the fact that a portion of nominal gains merely compensates taxpayers for the reduction in purchasing power of assets because of inflation. (Alternatively, one could directly eliminate the taxation of the inflationary component of gains without introducing a preferential rate, by indexing the basis for changes in the general price level.) On the other hand, keeping the rates on long-term gains, short-term capital gains, and ordinary income the same simplifies the tax system and promotes an efficient allocation of capital by equalizing tax rates among different types of financial instruments and real assets.

---

14. Office of the Secretary of the Treasury, Office of Tax Analysis, *Capital Gains Tax Reductions*, pp. 97-147 and expecially p. 131.

APPENDIXES

APPENDIX A

ALTERNATIVE ESTIMATES OF THE RESPONSE OF CAPITAL GAINS REALIZATIONS TO TAX RATES

The estimates reported in Table 10 of Chapter IV are only a few of the potential estimates that may be derived from equations that explain the realizations of capital gains using marginal tax rates on gains and other variables. This appendix reports alternative specifications of equations relating realizations to tax rates. These additional specifications include minor modifications of the basic equations and the use of alternative functional forms.

The minor modifications of the basic equation test a number of hypotheses. They examine whether it is possible to detect from the data either lagged or anticipatory effects of tax changes on capital gains realizations, and whether the realizations response is affected by inclusion of selected other variables. The changes in functional form are of two types. In the first, the consequences of changes in the functional form of the tax rate variable are examined. In the second, an alternative general functional form is estimated. The alternative general functional form is a nonlinear equation that posits a multiplicative relationship between realizations and estimated accrued gains, and that represents accrued gains as a linear combination of observed variables that affect both the total value and the tax basis of capital assets.

A concluding section examines in more detail the bias in the separate equations for the top 1 percent and bottom 99 percent of returns that results because induced realizations are included in the classifier used for splitting the sample. The procedure used for estimating the likely consequences of this bias is explained.

MINOR MODIFICATIONS OF THE BASIC EQUATION

Timing Effects

Lagged Tax Effects. As noted in Chapter IV, the coefficients of the marginal tax rate variable in the equations in Table 10 will be biased estimates of the long-run effect of tax rate changes on realizations if there are lagged responses to tax rates. If the long-run effect is smaller than the short-run effect, then the coefficient on the tax rate overstates the absolute size of the long-run effect; if the long-run effect is larger than the short-run effect, the coefficient on the current tax rate understates the long-run effect.

One way of testing the bias is to include the tax rate of the previous year in the equations in Table 10. As an illustration, Equation A2 in Table A-1 shows the effects of entering a lag term in Equation 2 of Table 10. (For purposes of comparison with alternative specifications, Equation 2 of Table 10 has been rewritten as Equation A1 in Table A-1.)

The negative coefficient on the lag term means that a less than complete adjustment to tax rate changes occurs in the first year. The lagged tax rate coefficient is, however, very small and not significantly different from zero. In comparison to the estimate in Equation A1 that a one-percentage-point increase in tax rates reduces realizations by 3.10 percent, Equation 2 implies that a one-percentage-point increase in tax rates reduces realizations by 3.00 percent in the first year and by 3.15 percent in the long run (the sum of the current and lagged coefficients). The implied long-run revenue-maximizing rate is only slightly lower than in Equation A1--31.7 percent instead of 32.3 percent.

Entering lagged variables into other equations (not reported here) gave the similar result that the coefficient on the lag term was not significantly different from zero. In some cases, the coefficient on the lag term was positive (indicating an overshooting in the first year); in other cases, it was negative (indicating, as above, less than full response in the first year). Thus, no time pattern of response has been identified.

The failure to find any effect with a single-period lag term should not be regarded as a conclusive finding that the entire realizations response occurs in the first year. More complex lagged relationships over a longer period of time could turn up either positive or negative lag effects. Because of the limited number of degrees of freedom in the equations, it is not feasible to test more complex relationships. What can be said, however, is that no statistical evidence was found of a lagged response of realizations to changes in the tax rate on capital gains.[1]

Anticipation of Future Tax Changes. When changes in tax rates are expected to occur in a future year, the time pattern of realizations is likely to be affected. If tax rates on capital gains are expected to increase, taxpayers are likely to accelerate realizations in order to pay taxes at the lower rate; in contrast, if rates are expected to decline, taxpayers have an incentive to delay realizations.

Expected future tax rate changes are of two types. Sometimes they are already built into current law, as when a tax law change has been enacted with a future effective date. An example is the Tax Reform Act of 1986, signed by the President on October 22, 1986, which eliminated the capital gains deduction effective on January 1, 1987. A second and more ambiguous situation is when taxpayers expect a change that has not yet been enacted into law. Because of the long time it takes to enact tax laws, investors frequently anticipate changes in advance of the legislation. (Sometimes changes are made retroactive in recognition of this possibility. For example, the reduction in the top capital gains rate to 20 percent in 1981 was effective June 20, 1981, even though the tax law change was not enacted until August.) It is not clear, however, at exactly what stage of the legislative process these expectations become strong enough to affect behavior.

---

[1] In contrast, the Treasury Department, using a sample for the years 1954-1982 instead of 1954-1985, did find evidence that realizations are related positively to the previous year's tax rate. This is interpreted as meaning that the long-run realizations response is smaller (in absolute terms) than the first-year effect. See Office of the Secretary of the Treasury, Office of Tax Analysis, *Report to Congress on the Capital Gains Tax Reductions of 1978* (September 1985), pp 175-176.

TABLE A-1. ALTERNATIVE EQUATIONS EXPLAINING CAPITAL GAINS REALIZATIONS FOR ALL TAXPAYERS, 1954-1985
Dependent Variable is log(LTG)

Equation and Description		Constant	log PRICE	log RCOEQ	log RGNP	dlog RGNP
A1	Basic (Equation 2 from Table 10)	-6.82	1.17	0.501	1.02	2.06
			(5.75)	(4.19)	(3.05)	(2.57)
A2	Adjustment to Past Tax Change	-6.84	1.17	0.497	1.03	2.06
			(5.45)	(3.66)	(2.88)	(2.51)
A3	Anticipation of Coming Tax Change	-6.80	1.17	0.500	1.02	2.07
			(5.60)	(3.93)	(2.99)	(2.45)
A4	Autocorrelation Correction	-7.66	1.17	0.565	1.07	2.30
			(5.05)	(4.64)	(2.76)	(2.90)
A5	Holding Period (In months)	-6.98	1.15	0.506	1.03	2.04
			(5.16)	(4.10)	(3.00)	(2.46)
A6	Compliance (0 before 1983)	-7.33	1.11	0.488	1.08	1.79
			(4.96)	(4.01)	(3.13)	(2.03)

SOURCE: Congressional Budget Office.

NOTES: t-statistics are in parentheses. Equation A4 is estimated from 1955 instead of 1954 because of the first-order autoregressive correction (Cochran-Orcutt technique). The Durbin-Watson statistic is not appropriate (n.a.) in equation A4.

Variables appearing in all equations are:

log(LTG) = logarithm of net long-term gains, in excess of net short-term losses;
log(PRICE) = logarithm of the GNP deflator;
log(RCOEQ) = logarithm of corporate equity held by households in constant dollars;

(Continued)

TABLE A-1. Continued

MTR	New Term	Regression Statistics			Revenue-Maximizing Tax Rate
		R^2	S.E.E.	D.W.	
-0.0310 (-2.47)	--	.988	.102	1.40	32.3
-0.0300 (-1.61)	MTR(-1) -0.00149 (0.07)	.988	.104	1.42	31.7
-0.0311 (-2.40)	dMTR(+1) 0.00490 (0.05)	.988	.104	1.40	32.2
-0.0319 (-2.28)	AR(1) 0.344 (1.63)	.988	.100	n.a.	31.4
-0.0309 (-2.41)	HOLDING 0.00300 (0.23)	.988	.104	1.41	32.4
-0.0267 (-1.94)	COMPLY 0.0845 (0.78)	.988	.103	1.47	37.4

NOTES: (Continued)

log(RGNP) = logarithm of GNP in constant dollars;
dlog(RGNP) = change from the preceding year in log(RGNP); and
MTR = weighted average marginal tax rate on capital gains.

Variables appearing as new terms in single equations are:

MTR(-1) = MTR from the preceding year (the 1954 value was used for 1953);
dMTR(+1) = legislated change in MTR in the coming year;
AR(1) = first-order autoregressive term;
HOLDING = number of months asset must be held to qualify for long-term capital gains treatment; and
COMPLY = one in years of broker reporting on stock sales (1983-1985), zero otherwise.

An attempt was made to test statistically for the effect of anticipated changes by including a variable for the change in the marginal tax rate on gains in the following year for years in which changes affecting marginal tax rates on capital gains were already enacted into law, but not in effect. There were only a few years in the sample in which this situation occurred:

- The 1964 act phased in lower marginal income tax rates over a two-year period. This change affected capital gains tax rates for taxpayers below the 50 percent bracket. (The 50 percent deduction for long-term gains and the 25 percent maximum rate on gains were unaffected by the act.) Thus, in 1964, the anticipated gains rate for 1965 was lower than the current rate for many taxpayers.

- The 1969 act eliminated the 25 percent maximum rate on long-term gains with a three-year phase-in between 1970 and 1972. Thus, in 1969, 1970, and 1971, the anticipated future year's rate was higher than the current rate.

- The 1978 act increased the capital gains deduction to 60 percent, removed the capital gains preference from the add-on minimum tax, and eliminated the "poisoning" of the maximum tax on earned income by capital gains. The increase in the deduction was effective October 31, 1978, but the minimum tax and maximum tax provisions were delayed until January 1, 1979. This delay made the anticipated future rate in 1979 slightly lower than the rate in 1978.

- The 1981 act lowered the maximum rate on capital gains to 20 percent, effective June 20, 1981, but phased in the marginal tax rate cuts on ordinary income over a three-year period. Taxpayers below the 50 percent marginal rate bracket thus could expect declines in capital gains tax rates in 1982, 1983, and 1984. This makes the anticipated future tax change variable negative for the years 1981-1983, although only slightly negative on average because the highest-income taxpayers received their entire capital gains tax rate cut in 1981.

Equation A3 in Table A-1 shows the effect of including an anticipated tax rate term in the equation. The coefficient is positive, showing that an enacted future tax rate increase raises current realizations, but it is not significantly different from zero. Inclusion of the future tax rate change in the equation has virtually no effect on the estimated response to the current rate.

The failure to identify an effect of legislated future changes on current realizations reflects the fact that, before 1986, delays in the effective date of changes in tax rates on capital gains were not that important. Further, within-year changes in the timing of realizations cannot be captured by the equations because only annual data on realizations are available. Thus, for example, in 1978 Congressional support for lowering the capital gains rate was evident quite early in the year. The 1978 act became law in October, and the effective date of the increase in the capital gains deduction was October 31. It is quite possible that taxpayers delayed gains realizations in 1978 until November to take advantage of the lower tax rate, but the data cannot capture this effect.

The effective date of the capital gains increase in the 1986 act provided a substantial incentive for taxpayers to accelerate realizations from 1987 and future years into 1986. Data that can be used to estimate the acceleration effect of the 1986 act are not yet available.

Correction for Autocorrelation of Residuals. The estimated Durbin-Watson (D.W.) statistic in Equation A1 suggests that there might be serial correlation of the residuals. Serial correlation does not result in biased estimates of coefficients, but could result in understatement of standard errors.

Equation A4 duplicates Equation A1, with a first-order autocorrelation term. The coefficient of AR(1) indicates a positive serial correlation of the residuals, but the coefficient is not significantly different from zero at the 5 percent level. The use of the autocorrelation correction has only a very slight effect on the other coefficients of the equation. The estimate of the reduction in capital gains realizations from a one-percentage-point increase in marginal tax rates on gains increases slightly from 3.10 percent to 3.19 percent, and the implied revenue-maximizing tax rate declines from 32.3 percent to 31.4

percent. The tax rate effect continues to be significantly different from zero.

Other Variables

Holding Period. An increase in the holding period for determining whether a gain is long-term can be expected to reduce long-term gains. This effect takes place because gains on assets held longer than the old holding period, but not as long as the new holding period, would be reclassified from long-term to short-term.

The holding period changed in three years of the sample period. In the 1976 act, it was increased from six months to nine months in 1977 and twelve months in 1978 and succeeding years. In the 1984 act, it was reduced to six months for gains realized in 1985-1987.

The holding-period effect is not expected to be large. The overwhelming share of realized capital gains are long-term even in years when the holding period is one year. For example, in 1984 net long-term gains (in excess of net short-term losses) were $134.1 billion; net short-term gains were only $4.8 billion.

The effect of the holding period on long-term realizations is tested by adding to the basic equation a variable for the number of months an asset must be held to qualify as long-term. The result is shown in Equation A5 of Table A-1. The coefficient of the variable HOLDING is small, statistically insignificant, and positive instead of negative. The addition of the holding-period variable does not significantly alter the coefficients of the other variables or the statistical fit of the equation.

Reporting Requirements. The Tax Equity and Fiscal Responsibility Act of 1982 introduced a number of new provisions to improve compliance with the income tax. Among these new provisions was a requirement that brokers report sales of assets to the Internal Revenue Service and supply information returns to taxpayers. Reporting was first required for assets sold after July 1, 1983.

The effect of the new reporting requirements is tested by including a "dummy" variable for compliance that is assigned the value zero for years before 1983 and the value one for 1983 through 1985.

This variable, called COMPLY, though meant to test for the effect of compliance provisions, will capture any structural shift in the equation for capital gains realizations for years beginning in 1983.

Equation A6 in Table A-1 shows the effect of adding the variable COMPLY to equation A1. The coefficient of COMPLY implies that some unspecified structural change, which could be interpreted as the effect of the compliance provisions, raised capital gains realizations by 8.45 percent above the level otherwise predicted by the equation. The standard error of the coefficient of COMPLY, however, is almost as large as the coefficient, indicating that the coefficient is not significantly different from zero. Including COMPLY in the equation results in a smaller estimate of the tax rate effect; the decline in realizations associated with a one-percentage-point increase in marginal rates is 2.67 percent, compared with 3.10 percent in Equation A1. The estimate of the revenue-maximizing tax rate on capital gains is 37.4 percent, instead of 32.3 percent.

The estimated 8.45 percent increase in reporting attributed to the compliance provisions of the 1982 act is about the most that could be expected from the provisions. In a recent study of the effects of the compliance provisions, Auten concludes that even complete reporting of gains on stocks and bonds would not raise total realizations by more than about 7.5 percent.2/ Underreporting of capital gains has been found to be between 15 percent and 25 percent in most years checked, while gains on corporate stocks and bonds account for about 30 percent of gains reported.3/ Thus if underreporting on stocks and bonds is as common as on other assets, full reporting of gains on stocks and bonds would raise total realizations by 7.5 percent (30 percent of the 25 percent underreported). This is probably a maximum figure because gains on stocks appear to be less subject to underreporting than other assets. Of course, the reporting requirements could serve to remind

---

2. Gerald E. Auten, *The Effect of Security Transactions Reporting Requirements on the Reporting of Capital Gains*, Report Prepared for the Research Division of the Internal Revenue Service, September 22, 1986, pp. 5-8.

3. Auten refers to a study for the Internal Revenue Service by ICF Incorporated in which underreporting of capital gains was estimated to range between 16 percent and 26 percent during the 1972 to 1983 period. (Gerald E. Auten, *The Effect of Security Transactions Reporting Requirements*, Table 4). Furthermore, the Internal Revenue Service has also estimated underreporting to be between 15 percent and 25 percent in four of six years studied between 1965 and 1982. See James M. Poterba, "Tax Evasion and Capital Gains Taxation," *The American Economic Review*, vol. 77 (May 1987), pp. 235-236.

taxpayers to report all gains, and in this way reporting could improve by more than the 7.5 percent possible from stocks and bonds alone.

In his study, Auten uses a similar approach to that of equation A6 and estimates an even larger upward shift in capital gains in and after 1983. Because the reporting requirements were only effective for part of 1983, Auten experiments with different degrees of response in 1983 and 1984 (his data ended in 1984). Auten finds compliance effects of 10 percent to 20 percent, depending on the year and the specification.[4] Because his estimated effects are greater than could be expected from improved reporting alone, Auten concludes that other events in 1983 and 1984 probably contributed to the estimated effects of compliance.

Use of Wealth Instead of Income Variables. The equations reported in Chapter IV and in Table A-1 of this appendix explain capital gains realizations as a function of marginal tax rates on capital gains, the value of corporate equity, GNP, and the change in GNP. In a recent paper, Lindsey estimated equations in which capital gains, in constant dollars, were represented as depending on marginal tax rates and measures of wealth in different types of assets (also in constant dollars).[5] Lindsey's sample of observations is a pooled cross-section time series for six AGI groups for the years 1965-1982. His estimates of the tax rate effect therefore depend both on how differences in realizations among taxpayer groups in the same year relate statistically to differences in marginal tax rates among groups and on how differences over time in realizations relate statistically to changes over time in marginal tax rates. In comparison, this study examines only time-series relationships.

Table A-2 reports time-series equations relating capital gains realizations to marginal tax rates and the measures of wealth used by Lindsey. The data for the years 1965-1982 on wealth and changes in

---

4. Gerald E. Auten, *The Effect of Security Transactions Reporting Requirements*, pp. 18-20 and Table 7.

5. See Lawrence B. Lindsey, *Capital Gains: Rates, Realizations and Revenues*, Working Paper No. 1893 (National Bureau of Economic Research, Inc., April 1986).

TABLE A-2. EQUATIONS EXPLAINING CAPITAL GAINS REALIZATIONS USING WEALTH INSTEAD OF INCOME VARIABLES (All taxpayers)

Dependent variable: log(LTG)

Equation and Description		Variables and t-statistics					Regression Statistics R²	S.E.E.	D.W.	Revenue-Maximizing Tax Rate
		CBO Variables								
		Constant	log RCOEQ	log RGNP	dlog RGNP	MTR				
A7	Equation 4 from Table 10	-8.42	0.425 (5.42)	1.30 (20.2)	1.98 (2.49)	-0.0388 (-4.51)	.951	.102	1.42	25.8
		Wealth Variables								
		Constant	log TRD	log NTRD	log REV	MTR				
A8	Lindsey Tax Rate 1965-1982	-6.11	2.28 (2.95)	-1.17 (-2.05)	0.0415 (1.02)	-0.00012 (-0.01)	.694	.120	1.73	Over 100
A9	CBO Tax Rate 1965-1982	-5.71	2.14 (2.54)	-1.07 (-1.68)	0.0460 (1.09)	-0.00454 (-0.24)	.696	.120	1.69	Over 100
A10	CBO Tax Rate 1954-1982	-10.8	2.10 (2.60)	-0.391 (-0.65)	0.0395 (0.86)	0.00130 (0.06)	.872	.142	1.02	Over 100
A11	CBO Tax Rate 1954-1985	-8.49	1.12 (1.97)	0.392 (1.02)	0.0741 (1.81)	-0.0254 (-2.14)	.904	.142	1.01	39.4

SOURCE: Congressional Budget Office.

NOTES: t-statistics are in parentheses.

log(RLTG) = logarithm of net long-term gains in excess of net short-term losses, in constant dollars;
log(RCOEQ) = logarithm of corporate equity held by households in constant dollars;
log(RGNP) = logarithm of GNP in constant dollars;
dlog(RGNP) = change from the preceding year in log(RGNP);
MTR = weighted average marginal tax rate on capital gains;
log(TRD) = logarithm of tradable wealth in constant dollars;
log(NTRD) = logarithm of nontradable wealth in constant dollars; and
log(REV) = logarithm of real revaluations in tradable wealth.

asset values are constructed using the sources and methods described by Lindsey, except that they are not allocated among income classes.6/

Lindsey constructed an estimate of the marginal tax rate on capital gains for each AGI group for the sample period in his study that is slightly different from the estimate of the marginal tax rate on gains for each AGI group constructed by CBO. In equations for the years 1965-1982 in Table A-2, both measures of marginal tax rates by AGI group are aggregated into a single average marginal tax rate on long-term gains for the entire sample.7/ For years before 1965 and after 1982, only the CBO marginal tax rate measure is available.

The equations estimated by Lindsey used realized gains in constant dollars, not current dollars, as the dependent variable. Therefore, for purposes of comparing CBO results with the exact specification of wealth measures used by Lindsey, Equation A7 in Table A-2 repeats Equation 4 from Table 10, which also uses long-term gains in constant dollars as the dependent variable. Lindsey groups all household assets into two variables, the value of tradable wealth and the value of nontradable wealth. He also includes the revaluation of tradable wealth in the variables explaining gains. All measures are in constant dollars.

Equation A8 is estimated for the years 1965-1982, using the average marginal tax rate measure constructed from Lindsey's tax rates. The estimate of the tax rate effect from this time-series equation is very small and not significantly different from zero. The coefficients of the wealth variables have the same sign as estimated by Lindsey, but the coefficient of the current year revaluation is not significantly different from zero. Equation A9 is the same as Equation A8, except that it uses CBO's marginal tax rate measure. Substitution of the CBO for the Lindsey tax rate measure affects the equation only slightly; the estimated marginal tax rate effect becomes larger, but is still small and not significantly different from zero.

---

6. As in the equations used in this paper, the wealth data used by Lindsey are those reported in Board of Governors of the Federal Reserve System, *Balance Sheets for the U.S. Economy*.

7. The marginal tax rate on gains for the entire population is computed as a weighted average of the marginal tax rate for each AGI group. The weights are "predicted" gains in each AGI class, with "predicted" gains estimated as described in footnote 11 of Chapter III.

Equations A10 and A11 use the Lindsey wealth measures (and CBO's marginal tax rate measure) for the years 1954-1982 and 1954-1985, respectively. Expansion of the sample back to 1954 has little effect on the estimate of the tax rate effect, but extension of the sample forward to 1985 makes the estimated effect of tax rates on realizations negative and statistically signficant. A one-percentage-point increase in marginal tax rates on gains lowers realized long-term gains (in constant dollars) by 2.54 percent, compared with a 3.88 percent reduction in the CBO specification.

The results reported in Table A-2 differ considerably from the findings by Lindsey because they are estimated over a different time period and because the taxpayers in different income groups are not used as separate units of observation.[8] They are shown only for the purpose of illustrating the consequences of a specification of the equation in Table 10 that uses wealth instead of income variables to explain changes in gains.

OTHER FUNCTIONAL FORMS

The equations reported above are similar to those in Table 10 of the text in one way--they all use the same functional form. The relationship between gains and nontax variables is represented in logarithmic form, while the relationship between gains and tax rates is log-linear. Because the functional form of the relationship could affect the results, estimates were made using equations with different functional forms. This section also shows the consequences of using a more explicit measure of accrued gains to explain realizations of gains.

Changes in the Tax Rate Variable

In Chapter IV, the estimated equation is of the form:

$$\log(LTG) = a_0 + a_1{*}\log(X) + a_2{*}MTR,$$

---

8. Lindsey's findings are summarized in Chapter II.

where LTG = realized long-term gains, MTR = the marginal tax rate on gains (in percents), and **X** = a vector of other variables believed to influence gains. The specification of a log-linear relationship between realized gains and the marginal tax rate on gains implies that the elasticity of realizations with respect to the tax rate becomes larger (in absolute terms) as the tax rate increases. For absolute values of the tax rate elasticity that are less than one, revenue changes in the same direction as tax rates; for elasticity values greater than one, the revenue effect is opposite in sign to the tax rate change. The revenue-maximizing rate, which occurs at an elasticity equal to -1.0, can be easily calculated as $MTR^* = -1/a_2$.

An alternative functional form that also permits a simple calculation of the marginal tax rate is a log-log form using the after-tax gain per dollar of pretax gain as the independent variable. Algebraically, this is represented as:

$$\log(LTG) = a_0 + \mathbf{a}_1 * \log(X) + a_2 * \log(100\text{-}MTR).$$

The value a_2 is now expected to be positive; that is, as the after-tax proceeds per dollar of pretax gain increase, realized gains will also increase.

As with the functional form used in Chapter IV, the form that is logarithmic in the after-tax gain implies that the elasticity with respect to the marginal tax rate increases (in absolute value) as the tax rate increases. It also implies a revenue-maximizing tax rate, calculated as:

$$T^* = 1/(1 + a_2).$$

Equations A12 and A13 in Table A-3 compare the two functional forms for the tax variable. Equation A12 repeats the equation with a semilog form reported as Equation 2 in Table 10 and Equation A1 in Table A-1. Equation A13 is the same as Equation A12, except that the tax rate variable is the logarithm of 100 minus the marginal tax rate. The coefficients of the nontax variables and the fit of the equation are virtually unchanged by the substitution of the new tax rate variable. The implied revenue-maximizing tax rate declines slightly from 32.3 percent to 28.3 percent; the lower revenue-maximizing rate results from a greater curvature outside of the sample range (discussed below).

Equation A14 in Table A-3 reports the result of a logarithmic specification between realizations and marginal tax rates. In Equation A14, there is no revenue-maximizing rate because the functional form assumes a constant elasticity. The estimated elasticity of -0.554 implies that revenue increases as marginal tax rates are raised, for all tax rates.

Finally, Equation A15 shows the results of entering the tax rate with both a linear and a squared term (quadratic form). In this form, the implied curvature of the revenue function is much greater than in the others, and the revenue-maximizing rate is only 21.4 percent. The separate coefficients of MTR and MTR^2, however, are not statistically significant, indicating that the estimates of the exact curvature of this relationship are not reliable.

Figure A-1 shows the relationship between revenues and marginal tax rates under the four alternative specifications of the tax rate variable. Between average marginal tax rates of 13 percent and 23 percent--the limits of the average marginal tax rates for all returns in the sample period--the shapes of all four estimated relationships are practically identical. The four functional forms do, however, imply different relationships between revenue and tax rates outside the sample range. The logarithmic form has the least curvature, implying that revenues will continue to increase no matter how high marginal tax rates are increased. With all the other functions, revenues eventually decline as the marginal tax rate is increased. The revenue curves for the log-linear and after-tax return specifications begin to move farther apart for rates above 30 percent; both curves show revenue eventually declining with higher marginal tax rates, but the decline is greater with the after-tax return specification. The quadratic specification has the greatest curvature, with revenue peaking at 21 percent and declining sharply at higher rates.

Nonlinear Equations with Accrued Gains

As discussed in Chapter IV, accrued gains depend on both the value of assets and their cost basis. Increases in the value of assets increase accrued gains; increases in basis reduce accrued gains. Data on the cost basis of assets are not available.

While basis cannot be observed directly, it does depend on other variables that can be measured. Realization of gains in previous years reduces current asset basis; transfer of assets with gains at death also reduces basis; tax depreciation deductions in excess of economic depreciation increase basis. Past realizations of capital gains can be observed directly (although unreported gains, which also increase basis if reinvested, are unobserved); gains at death should vary directly with the number of deaths in the population; and excess depreciation deductions claimed by individuals can be estimated from reported

TABLE A-3. EQUATIONS EXPLAINING CAPITAL GAINS REALIZATIONS USING ALTERNATIVE TAX RATE SPECIFICATIONS (All taxpayers, 1954-1985)
Dependent variable: log(LTG)

Equation and Description		Constant	log PRICE	log RCOEQ	log RGNP	dlog RGNP
A12	Basic (Equation 2 from Table 10)	-6.82	1.17	0.501	1.02	2.06
			(5.75)	(4.19)	(3.05)	(2.57)
A13	After-tax Rate of Return	-18.5	1.18	0.501	1.02	2.08
			(5.80)	(4.19)	(3.06)	(2.60)
A14	Logarithmic Tax Rate	-5.83	1.16	0.504	1.03	1.98
			(5.54)	(4.18)	(3.01)	(2.45)
A15	Quadratic Tax Rate	-7.31	1.23	0.504	0.971	2.34
			(5.36)	(4.15)	(2.77)	(2.46)

SOURCE: Congressional Budget Office.

NOTES: t-statistics are in parentheses.

log(LTG) = logarithm of net long-term gains in excess of net short-term losses;
log(PRICE) = logarithm of GNP deflator;

(Continued)

data in the National Income and Product Accounts. Thus, using incomplete data, one can express accrued gains as a function of variables correlated with wealth in capital assets and variables correlated with basis.

Table A-4 reports an equation in which accrued gains are represented as a linear combination of other variables. The equation for realized gains is of the form:

$$\text{(A16)} \quad \log(\text{LTG}) = a_0 + a_1{*}\log(\text{PRICE}) + a_2{*}\text{MTR} + a_3{*}\log(\text{RAG})$$

TABLE A-3. Continued

MTR	New Term	Regression Statistics			Revenue-Maximizing Tax Rate
		R^2	S.E.E.	D.W.	
-0.0310 (-2.47)		.988	.102	1.40	32.3
	log(100-MTR) 2.53 (2.48)	.988	.102	1.40	28.3
	log(MTR) -0.554 (-2.41)	.988	.103	1.42	None
0.0680 (0.38)	MTR^2 -0.00268 (-0.56)	.988	.104	1.37	21.4

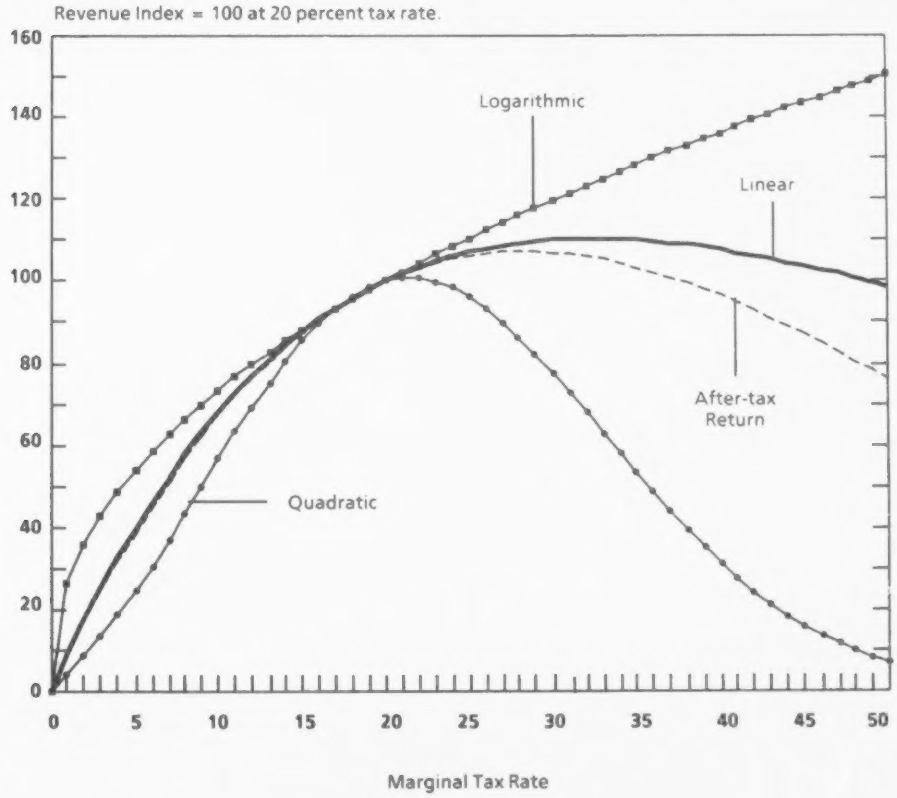
NOTES: (Continued)

log(RCOEQ) = logarithm of corporate equity held by households in constant dollars;
log(RGNP) = logarithm of GNP in constant dollars;
dlog(RGNP) = change from the preceding year in log(RGNP); and
MTR = weighted average marginal tax rate on long-term capital gains.

where LTG = realized long-term gains, PRICE = the price level, MTR = the marginal tax rate on long-term gains, and RAG = accrued gains in constant dollars. Accrued gains in constant dollars are represented by:

$$\text{(A17)} \quad RAG = b_1{*}CORP + b_2{*}NCORP + b_3{*}GNS + b_4{*}DEATH$$

Figure A-1.
Relationship of Revenue from Capital Gains Taxes to the Marginal Tax Rate on Gains for Four Specifications of the Tax Rate Variable



SOURCES: Congressional Budget Office.

TABLE A-4. EQUATION EXPLAINING CAPITAL GAINS REALIZATIONS USING CHANGES IN ASSET VALUES AND BASIS
(All taxpayers, 1954-1985)
Dependent variable: log(LTG)

Variable	Coefficient	t-statistic
constant, c_1	-2.22	-0.75
log(PRICE), a_1	1.27	3.72
MTR, a_2	-0.0205	-1.34
Accrued gains, a_3	0.926	2.85
NCORP, c_2	1.19	1.73
GNS, c_3	2.78	1.50
DEATH, c_4	-74.2	-1.60

$R^2 = .982$ S.E.E. = .126 D.W. = 1.43 $T^* = 48.7$

SOURCE: Congressional Budget Office.

NOTES:
log(LTG) = logarithm of net long-term gains in excess of net short-term losses;
log(PRICE) = logarithm of GNP deflator;
MTR = weighted average marginal tax rate on long-term capital gains;
Accrued gains = defined in equation A17 of the text;
NCORP = sum of past revaluations of noncorporate equity plus the difference between tax and economic depreciation on noncorporate capital, in constant dollars;
GNS = sum of past realized gains in constant dollars;
DEATH = sum of deaths in previous years; and
T^* = revenue-maximizing tax rate.

where CORP = the sum of past revaluations of corporate equity, NCORP = the sum of past revaluations of noncorporate equity plus the difference between tax and economic depreciation on noncorporate capital, GNS = the sum of past gains, and DEATH = the sum of deaths in prior years.[9]

Combining A16 and A17 gives the estimating equation for realized gains:

---

[9] All the sums of past variables are cumulated from 1947 except for past realizations of gains, which are unavailable before 1954. All dollar amounts are assigned a starting value in the year prior to cumulation. The starting value is selected so as to make the calculated values consistent with data on the ratio of gains to sales prices of assets in 1977. This ratio was calculated by the Joint Tax Committee using IRS data.

$$\text{(A18)} \quad \log(LTG) = c_1 + a_1{*}\log(PRICE) + a_2{*}MTR + a_3{*}\log(CORP + c_2{*}NCORP + c_3{*}GNS + c_4{*}DEATH)$$

where $c_1 = a_0 + a_3{*}\log(b_1)$, $c_2 = b_2/b_1$, $c_3 = b_3/b_1$, and $c_4 = b_4/b_1$.

Equation A18 is estimated by a nonlinear technique. The result is shown in Table A-4. The estimated coefficient of the marginal tax rate on gains continues to be negative, but is smaller than in the equations reported in Table 10 of the text and is not statistically different from zero. The implied revenue-maximizing rate is 48.7 percent, much higher than in any of the equations estimated using simple wealth and income measures.

Four of the other five coefficients in the equation have the expected sign. The coefficient of the price term implies that a doubling of the price level raises nominal realizations by 127 percent; the estimated elasticity of nominal gains with respect to the price level is significantly different from zero, but not significantly different from one. The coefficient of accrued gains is also close to one, implying a unit elastic response of realizations to accruals. Two of the three terms used to explain accrued gains have the expected sign. Past revaluations of noncorporate equity, net of excess tax depreciation, are positively related to realized gains. An increase in deaths, which lowers accrued gains by reducing basis, is found to be negatively related to realizations. The coefficient on past realizations, however, does not have the hypothesized sign. Even though past realizations should increase basis, thereby reducing accrued gains, they are estimated to be positively related to current realized gains.

BIAS RESULTING FROM THE CLASSIFICATION OF TAXPAYERS BY AGI

As discussed in Chapter IV, classifying taxpayers by AGI can result in bias in estimating separate time-series equations explaining gains for different groups in the population. This bias results because AGI includes realized gains. In years when gains increase relative to other sources of income, taxpayers whose gains account for a large share of their AGI will make up a greater than normal share of returns in the top 1 percent. Thus, the increase in gains in the top 1 percent of returns ranked by AGI will be greater than the increase in gains for the top 1 percent of a fixed population of taxpayers. If the increase in realized gains is induced by a decline in tax rates on capital gains, the tax effect on gains for the top 1 percent of returns ranked by AGI will be overstated, and the tax effect on gains for the bottom 99 percent understated, compared with the induced tax effects that would be estimated for taxpayer groups whose composition does not change.

In the equations for separate groups in the population reported in Tables 12 and 13 (in Chapter IV), returns must be classified by AGI because that is how published data are reported for the years 1954 through 1985. For seven years of the sample period, however, samples of individual tax returns were available that could be used to develop rankings of taxpayers by other classifiers. For years in which these data were available, returns may be classified by AGI less gains, a procedure that eliminates the bias that occurs when changes in gains alter the composition of returns in the top 1 percent.

As a test of how the bias influenced the results for the entire time period, an equation was estimated relating the shares of gains in the top 1 percent under the two classifiers for the seven years in which samples of individual tax returns were available. The estimated equation is of the form:

$$\text{(A19)} \quad D = a + b^{*}R$$

where D = the difference between the percentage of gains realized by the top 1 percent classified by AGI and classified by AGI less gains, and R = realized gains as a share of AGI. The coefficient of b is expected to be positive, reflecting that an increase in realized gains for the entire population increases the extent to which gains in the top 1 percent classified by AGI exceed gains in the top 1 percent classified by a measure (AGI less gains) that is unaffected by induced gains.

In Equation A19, the coefficient b is estimated to be 0.38, with a standard error of 0.28. The positive coefficient on b indicates a bias in the direction hypothesized, but the standard error with only seven observations is so large that the coefficient is not statistically different from zero.

The estimated equation was used to develop corrected measures of gains for the top 1 percent and bottom 99 percent of the population. When the corrected measures are inserted in equation 1.01 in Table 12 and in equation 1.99 in Table 13, the estimates of the tax response are only slightly altered. The tax rate coefficient--that is, the estimated percentage change in realizations per percentage-point change in the marginal tax rate on gains--is reduced from -.0323 to -.0316 for the top 1 percent of returns by using the corrected measure of gains. The tax coefficient is increased from -.0329 to -.0348 for the bottom 99 percent of returns. These small changes in the coefficients suggest that the bias introduced from classifying the population by AGI, though in the expected direction, is apparently small.

CONCLUSIONS

This appendix has reviewed a wide range of alternative ways of specifying equations for the realization of capital gains. Many of the alternative specifications do not significantly alter the results reported in Chapter IV. Lagged and anticipatory responses to tax rate changes could not be identified from the sample, and equations incorporating them did not alter the estimate of the realizations response. Changes in the functional form for the tax variable also do not have much effect on the results, unless they are used to project the effects of tax rate changes that are far outside the range of past historical experience. Changes in the holding period and in compliance requirements do not appear as significant determinants of realizations of gains within the sample period. Finally, the bias in estimating the response for separate groups of taxpayers that results from using AGI as a classifier appears to be small.

The results are affected, however, by the choice of income and wealth variables used to represent the potential for realizing gains. In the specifications reported in this appendix, the realizations response is greatest when potential gains are represented by including both measures of income and wealth in corporate equities in the equation. When measures of wealth in other assets are substituted for the income measure, the estimate of the realizations response declines. When a proxy variable for accrued gains is constructed by including variables that contribute to both wealth and basis, the estimated realizations response falls even more. Other combinations of variables that were not tested could result in larger or smaller estimates of the realizations response.

The sensitivity of the estimate of the realizations response to the specification of other variables included in the equation adds to the uncertainty of the results. This uncertainty cannot be resolved because, even if all possible combinations of variables were tested, it could still be debated which one represented the correct specification.

APPENDIX B

METHODOLOGICAL ISSUES IN STUDIES OF THE REALIZATIONS RESPONSE

As shown in Chapter II, the results of studies of the realizations response to tax rates on capital gains differ between those using cross-section and those using time-series approaches. The cross-section studies tend to show a greater responsiveness of realizations to tax rates. This appendix briefly reviews the strengths and weaknesses of each.[1] The review suggests that, while each has much to contribute, the cross-section approach is more likely to overstate the responsiveness of realizations to tax rates. The limitations of the time-series approach, on the other hand, can lead to a wide range of uncertainty about the correct response but do not clearly point toward over- or understatement.

CROSS-SECTION AND TIME-SERIES APPROACHES

Cross-section studies compare realizations among taxpayers with different tax rates in a single year. Time-series studies compare realizations for all taxpayers as tax rates change over time. Cross-section studies may employ limited data from other years, as in calculating expected tax rates for the year in question, and time-series studies may disaggregate to subgroups of the population. A third alternative is to combine time-series and cross-section analysis by using as separate observations data for individual taxpayers in multiple years. Tax data for the same taxpayer in many years are generally unavailable, but groups of taxpayers classified by AGI have been used in one study by Lindsey.2/ He subdivided taxpayers into six income categories in each of the years from 1965 to 1982.

---

[1] For other discussions of methodology, see Jane G. Gravelle, "A Proposal for Raising Revenue by Reducing Capital Gains Taxes?" Congressional Research Service Report (June 30, 1987); Eric W. Cook and John F. O'Hare, "Issues Relating to the Taxation of Capital Gains;" *National Tax Journal*, vol. 40 (September 1987); and Office of the Secretary of the Treasury, Office of Tax Analysis, *Report to Congress on the Capital Gains Tax Reductions of 1978* (September 1985), pp. 158-162.

ISSUES IN CROSS-SECTION STUDIES

Advantages of Cross-Section Studies

The advantages of cross-section studies obtain from their use of data from individual tax returns. First, the data from a single tax return reflect the situation of a single behavioral unit--the single taxpayer or a family. Thus the level of realizations can be directly matched to that taxpayer's tax rates, income from different sources, and family status. Second, thousands of records are available and multicollinearity tends to be low. As a result, stable coefficients with low standard errors can be estimated even though many determinants of gains are included.

Problems Unique to Cross-Section Studies

The major problems inherent in cross-section studies are the dependence of tax rates on taxpayer behavior, the commingling of responses to temporary and permanent changes in tax rates, and the limitations of data provided on tax returns.

Dependence of Marginal Tax Rates on Taxpayer Behavior. The most serious shortcoming of the cross-section studies is that the explanatory variable of interest is not independent of the taxpayer's behavior. The group of taxpayers under observation are all facing the same tax law. For a given filing status and family size, differences in marginal tax rates can result only from differences in the level of taxable income. This means that differences in tax rates among taxpayers reflect either differences in pretax income levels or differences in behavior with respect to the form in which income is received, the amount of deductions claimed, or the realization of capital gains.

---

2. Lawrence B. Lindsey, *Capital Gains: Rates, Realizations and Revenues*, Working Paper No. 1893 (National Bureau of Economic Research, Inc., April 1986).

Thus, a negative relationship between realizations and marginal tax rates among taxpayers, often interpreted to mean that lower marginal tax rates cause more realizations, can have an alternative and equally plausible interpretation. It could instead mean that taxpayers who undertake behavior that lowers their tax rates also have more gains.

This problem of interpretation has two separate sources. The first relates to the direct causal relationship between capital gains realizations and the marginal tax rate. As taxpayers realize more gains, they may move into higher tax brackets. This tax bracket effect produces a positive statistical relationship between realizations and marginal tax rates that partially offsets the hypothesized negative causal link running in the opposite direction from tax rates to realizations. Without correction for this bias, statistical studies might underestimate the degree to which realizations are negatively affected by high tax rates. The cross-section studies reviewed in Chapter II eliminated this source of bias by using a "corrected" marginal tax rate measure that is independent of the taxpayer's level of realizations.

The second source of bias is that other aspects of a taxpayer's behavior--in particular, the taxpayer's choice among alternative investment assets--can also affect the marginal tax rate. This source of bias probably results in an overstatement of the effect of tax rates on realized gains, but has not been corrected for in published work because it is harder to identify directly. For example, consider a taxpayer who holds stocks with high dividend payout ratios and does not invest in tax shelter activities. This taxpayer will have a higher marginal tax rate, at the same level of economic income, than one who chooses a more risky strategy of holding growth stocks and tax shelter investments, and will also hold assets that generate much fewer capital gains. Thus, a comparison of the two taxpayers may produce a negative statistical relationship between tax rates and realized capital gains that reflects differences in the portfolio holdings of the two taxpayers, not a causal link between tax rates and the propensity to realize gains. More generally, since any difference in observed marginal tax rates between two taxpayers with the same income level in the same year reflects some differences in their behavior, the causal link between tax rates and gains in cross-section studies is highly ambiguous. One must assume, in effect, that the behavior that affects marginal tax rates has no independent influence on the level of realized capital gains in order to conclude that the estimated coefficient of the marginal tax rate term indicates how much realizations will change in response to a legislated change in the tax rate.

Transitory versus Permanent Tax Rates. A second problem of interpretation is that some of the differences in marginal tax rates among taxpayers in any year reflect temporary instead of long-run differences. A high-income taxpayer may have a temporarily low tax rate in any given year because of extraordinary medical expenses, temporary business losses, or a number of other circumstances. Taxpayers with varying levels of taxable income have an incentive to realize gains in those years when their tax rates are temporarily low. These timing effects do not, however, imply that realizations will be permanently higher if the tax rate schedule is lowered. Thus, if some of the differences in tax rates among taxpayers are temporary, the estimated permanent effect of lower marginal tax rates on realizations in studies using data from one year is biased upward.

As noted in Chapter II, several studies have adjusted in part for this problem by using panel data that follow the same taxpayers over several years. These studies use separate measures of "transitory" and "permanent" marginal tax rates, where the permanent tax rate is the average of marginal tax rates in the year of observation and the two previous years.3/ The use of separate permanent and transitory rates lowers the estimated tax rate effect, although there continues to be an estimated "permanent" effect of lower marginal tax rates on realizations in these studies, as summarized in Chapter II.

Data Limited to Tax Returns. The advantage cross-section studies enjoy of using individual taxpayer records is also a limitation because tax return data omit some important explanatory information, among the most crucial of which are data on asset holdings. In theory, accrued gains should be included as a variable explaining differences in realizations among taxpayers. While time-series studies can use wealth measures as approximations of accrued gains, the cross-section studies cannot do this because no direct measure of wealth is reported on tax returns.

---

3. See Gerald E. Auten and Charles T. Clotfelter, "Permanent Versus Transitory Tax Effects and the Realization of Capital Gains," *Quarterly Journal of Economics*, vol. 97 (November 1982), and Office of the Secretary of the Treasury, *Capital Gains Tax Reductions*.

In place of wealth, cross-section studies must use "proxy" measures of income that are reported on tax returns and are believed to be correlated with wealth (and therefore with accrued capital gains). Dividends are used as a proxy for wealth in corporate equities, and income reported on tax returns from partnerships, proprietorships, and farms is used as a proxy for the market value of other assets that give rise to capital gains. The tax return values are imperfect, however, because dividend-payout ratios differ among stocks held by different taxpayers and because reported net income from partnerships and proprietorships on tax returns is a very poor indicator of economic income.4/ The choice of an "incorrect" income measure can bias the estimate of the effect of marginal tax rates on realizations.

Other Issues. Other problems on which investigators have differed include the choice of which other variables to use in explaining capital gains, the appropriate estimating technique, and the correct method of weighting observations.5/ These methodological problems, and the different ways they are handled, explain in part the wide range of tax rate responses estimated in cross-section studies.

ISSUES IN TIME-SERIES STUDIES

Time-series analyses can avoid the major problems of cross-section studies, but at the expense of incurring different problems. The main problem of time-series analyses is the limited number of years of data; other problems are the aggregate nature of the data and difficulties in determining the timing of tax changes.

---

4. As an alternative, the Treasury Department study used positive income only as a proxy for wealth. See Office of the Secretary of the Treasury, *Capital Gains Tax Reductions*.

5. The appropriate estimating technique is an issue because many taxpayers realize no capital gains in any particular year. In such samples, the commonly used technique of ordinary least squares regression gives biased estimates and normal tests of significance are inappropriate. One way to correct the problem is to use an alternative technique, such as Tobit analysis, that constrains the dependent variable. See Office of the Secretary of the Treasury, *Capital Gains Tax Reductions*.

Advantages Over Cross-Section Studies

One major problem of cross-section studies is that the tax rate is not independent of the individual's behavior, and may actually be decided simultaneously with the individual's decision to realize gains. This problem is largely avoided in time-series analysis because the major changes in marginal tax rates are caused by legislation and are outside an individual's direct control.6/

A second problem with cross-section analysis is that differences among individuals in a single year may be a poor guide to how any one of them will respond to changes in his or her tax rates, particularly how slow or rapid that response will be. Since time-series studies are based on the actual level of aggregate realizations, patterns of response spread out over more than one year may be detected.

A third advantage of aggregate time-series analysis over cross-section analysis is that data from many different sources can be used. For example, in this study, realizations and marginal tax rates from tax returns are combined with corporate equity values reported by the Federal Reserve Board and with GNP, price level, and depreciation data from the National Income and Product Accounts. Approximating these nontax variables from information on tax returns would sacrifice accuracy.

Problems Unique to Time-Series Analysis

Few Years of Data. One major problem in time-series analysis, though not in cross-section studies, is the limited number of observations. Tax return data on realizations and marginal tax rates used in these studies go back only to 1954, and the most recent available tax

---

6. A form of endogeneity could be introduced in the construction of average tax rates, but this can be avoided by not using current year realizations in calculating marginal tax rates or in aggregating rates among income classes. In this study, a standardized level of realizations is obtained for each AGI class in each year, and that amount is used to calculate marginal tax rates and to aggregate rates among classes. A simpler alternative is to use the legislated maximum rate on capital gains. This alternative eliminates endogeneity, but at the cost of suppressing relevant data on changes in tax rates faced by taxpayers below the highest-income group.

return data are for 1985.7/ That gives 32 observations, effectively limiting the analysis to 5 to 10 independent variables.

The available data are actually even more limited than the number of observations would suggest. To begin with, major changes in tax rates have occurred only five times in the 32-year period, and only three distinct periods stand out. As Figure 4 in Chapter III shows, rates were steady through 1969, rose through 1978, and were low again from 1979 on. Moreover, many features of the economy change only slowly from one year to the next causing many of the explanatory variables to be highly correlated over the 32 years or for important segments of those years. For example, the era of high tax rates on gains coincides with an era of high inflation and low appreciation of stock prices. Similarly, the era of rapidly rising realizations since 1978 coincides with declining tax rates, a rising stock market in most years, the growth of accelerated depreciation and tax shelters, the growth of corporate takeovers and leveraged buy-outs, a decline in brokerage commissions, and the imposition of reporting requirements on stock sales. It is not possible to distinguish completely the separate influence of tax rate changes when the changes are few and several other changes happen at about the same time.

Aggregated Data. Most estimated time-series equations are specified as if the data reflect a single representative taxpayer over the entire sample period. The composition of the taxpaying population, however, has changed substantially over the past 30 years. Since 1954, the population has become older, households have come to hold a greater share of their equity indirectly in pension funds and mutual funds, and the ownership of corporate equity, as estimated by dividend income, appears to have become less concentrated among the highest-income groups. Each of these changes could cause shifts in the response of realizations to tax rates, as could many other changes in the population, but their effects are not captured in the aggregate time-series models.

Even if the population were completely static, as assumed by the aggregate models, the aggregate data do not precisely reflect the sum of the relevant data for individual taxpayers. Realizations are often

---

7. Data for years before the mid-1970s are available only in printed form, precluding the construction of variables in any way not already tabulated.

used logarithmically or as a ratio to other aggregate variables. Even when the log form is appropriate, the aggregation introduces some imprecision because the logarithm of total realizations is not equal to the sum of the logarithms of realizations for each individual taxpayer. The choice of a representative marginal tax rate illustrates a different type of aggregation problem. Ideally, one would want to use a gains-weighted average of marginal tax rates across all tax returns. This cannot be closely approximated in the absence of data on a large sample of individual returns. In some studies, the maximum capital gains tax rate is used to represent tax rates for all taxpayers.8/ In this study, tax rates are imputed to classes of taxpayers at different AGI levels and then a weighted average marginal tax rate is calculated. This approach represents a wider range of taxpayers than the use of the maximum rate alone, and can capture the effects of changes in rates below the top rate. Because individual records are unavailable, however, the calculation of the average marginal rate for each AGI class is necessarily imprecise. No account can be taken of filing status; those with realized gains cannot be isolated from other returns; and the within-class distribution of gains and marginal tax rates is unavailable.

Timing of Tax Changes. A final time-series problem is the difficulty of representing the time at which legislated tax changes begin to affect realizations. When legislative changes take effect in the middle of a year, as in 1978 and 1981, it is not possible from available tax data to determine what portion of a year's gains occurred after the change. Furthermore, tax legislation often takes a long time to be enacted into law, so that the prospect of a change in law may affect realizations before the change is actually enacted. For example, the tax changes enacted in 1981 were discussed in the 1980 election campaign and even before, so that it is impossible to know just when the changes, or their prospect, may have altered behavior. The opportunity to observe the timing of responses to tax changes, even if imprecisely, is one potential advantage of the use of time-series analysis that may be better utilized when post-tax-reform data become available. (An equation that attempts to estimate the impact of anticipated tax changes is presented in Appendix A.)

---

8. Office of the Secretary of the Treasury, *Capital Gains Tax Reductions*.

COMBINED TIME-SERIES AND CROSS-SECTION ANALYSIS

An ideal but currently unobtainable data base for studying the effect of marginal tax rates on the realizations of capital gains would be one having many observations as used in cross-section studies, but that also allowed the researcher to observe the effects of changes in the tax law over time. Such a data file might consist of a large sample of records of individual taxpayers that included data on capital assets transactions and followed the same taxpayers over an extended time period. Some studies have made use of such "panel" data, but the data have generally not encompassed years when there have been major changes in the tax law.

The major use to date of taxpayer panel data in studying capital gains has been to modify slightly the results of single-year cross-section studies. As described above, the data from adjoining years have been used to develop separate measures of "transitory" and "permanent" marginal tax rates for individual taxpayers, with the permanent rates constructed as an average of marginal tax rates over several years. In all these studies, the dependent variable is still realizations in a single year; no effort has been made to estimate the actual response of individual taxpayers to changes in the tax law over time.

Work with panel data would appear to be a fruitful course of study. At the present time, however, no taxpayer panel that includes the desired information on sales of capital assets and covers recent years in which capital gains taxation has been changing is publicly available.

As noted in the literature review in Chapter II, Lindsey has performed a pooled cross-section time-series study, which takes as units of observation six separate taxpayer groups over a period of 18 years, and found a significant and large negative relationship between realized long-term capital gains and marginal tax rates on gains. The taxpayer groups are defined by ranges of AGI that are fixed in absolute dollars; thus, they do not include the same taxpayers in different years and also each group represents a different percentage of the total taxpaying population in different years. As discussed in Appendix A, aggregate time-series equations using variables similar to those used by Lindsey do not reveal a negative statistical relationship between capital gains and marginal tax rates. It would appear that Lindsey's results reflect primarily the effects of differences in tax rates and realizations among groups of taxpayers instead of the effects of changes in tax rates over time.

The use of taxpayer groups as the unit of observation raises difficult problems of interpretation in addition to those in cross-section studies using individual data. When using income groups, the finding of a negative relationship between marginal tax rates and gains realizations occurs because those groups with the lowest marginal tax rates--that is, the lowest-income groups--realize more gains than would be expected given the amounts of dividend income, interest income, and income from other capital assets received by taxpayers in those groups. As with other studies, one must ask whether the higher realized gains result because of the independent effect of lower marginal tax rates on gains or because of some other difference between the observed taxpayers. In the case of cross-section studies of individuals, one can control for the effects of many other taxpayer variables, including the taxpayer's total income. When using broad income groups as units of observation, however, one cannot examine the effects of marginal tax rates on the behavior of taxpayers with similar incomes. Thus, while the findings can be suggestive of a potentially large inverse relationship between tax rates and gains, they could also simply be capturing some other relationship among sources of capital income received by different income groups.

CONGRESSIONAL
BUDGET OFFICE
Second and D Streets, S.W.
Washington, D.C. 20515

OFFICIAL BUSINESS
PENALTY FOR PRIVATE USE, $300

FIRST-CLASS MAIL
POSTAGE & FEES PAID
C.B.O.
PERMIT No. G-70